Vol. I APRIL, 1919 No. 1

F 21622
182

THE PAPER INDUSTRY

A Monthly Educational Journal Devoted to the Paper Industry.

LIBRARY
RECEIVED
JUN 4 1919
U. S. Department of Agriculture

SIMONDS

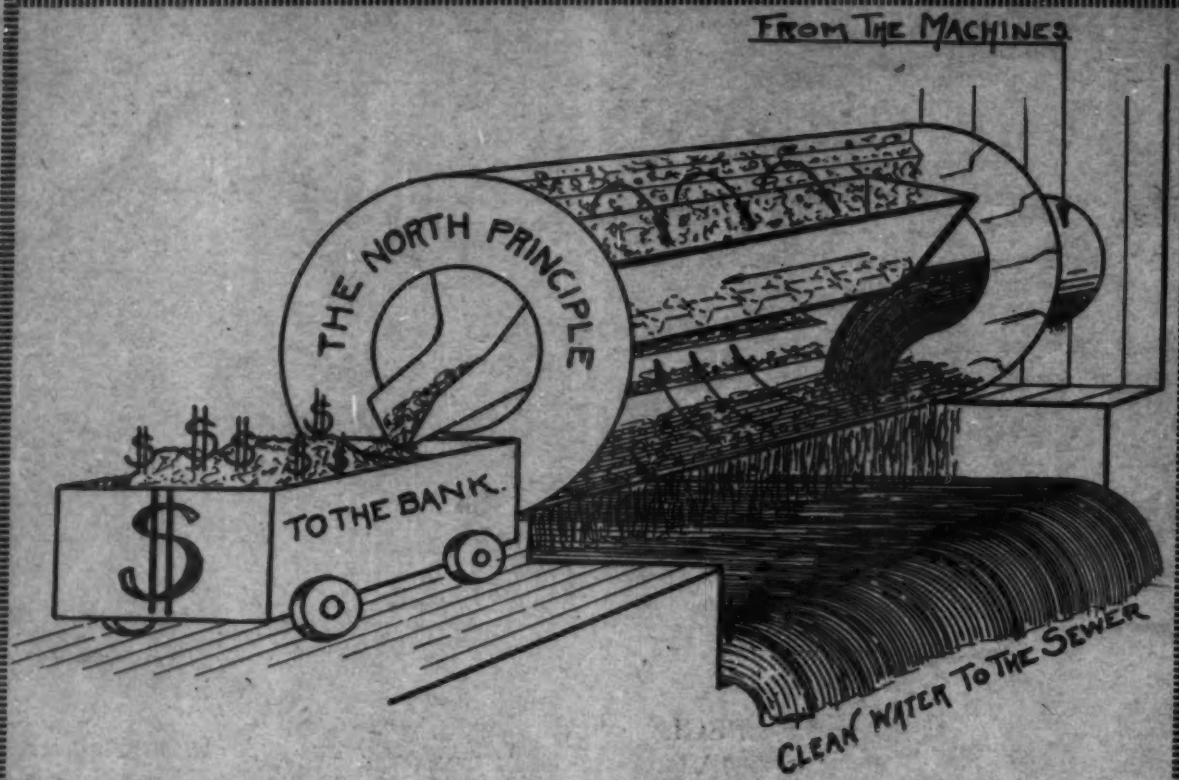
THE MARK OF SAW QUALITY

GREETINGS to the Paper and Pulp Mill Industries, from Simonds, the makers of quality Saws, Chipper, Barker and Paper Knives, world famous, and used nearly everywhere.

SAWS and KNIVES

Simonds Manufacturing Company

Fitchburg, Mass. New York City | Chicago, Ill. Memphis, Tenn. | New Orleans, La. San Francisco, Cal. | Portland, Ore. Seattle, Wash. | Lockport, N. Y. Montreal, Que.



The North Save-All

A horse-sense, simple machine, saved stock either six percent dry or wet to pump. Horse-power is one only. No excess up-keep. No leaks. We make a special inlet machine so you can place it on your machine floor. No pumping. The only one that can do this. We think we know your conditions. ***Sent on trial.***

The North Water Filter

Three sizes, Five, Seven and Ten Million Gallons in Twenty-four Hours. One Horse-power. Sent on Trial. You Can't Sell Dirty Paper Now.

The Scott Shredder

Eight Horse-power. Three Thousand Pounds per Hour. No Upkeep.

The North Pulp Washer

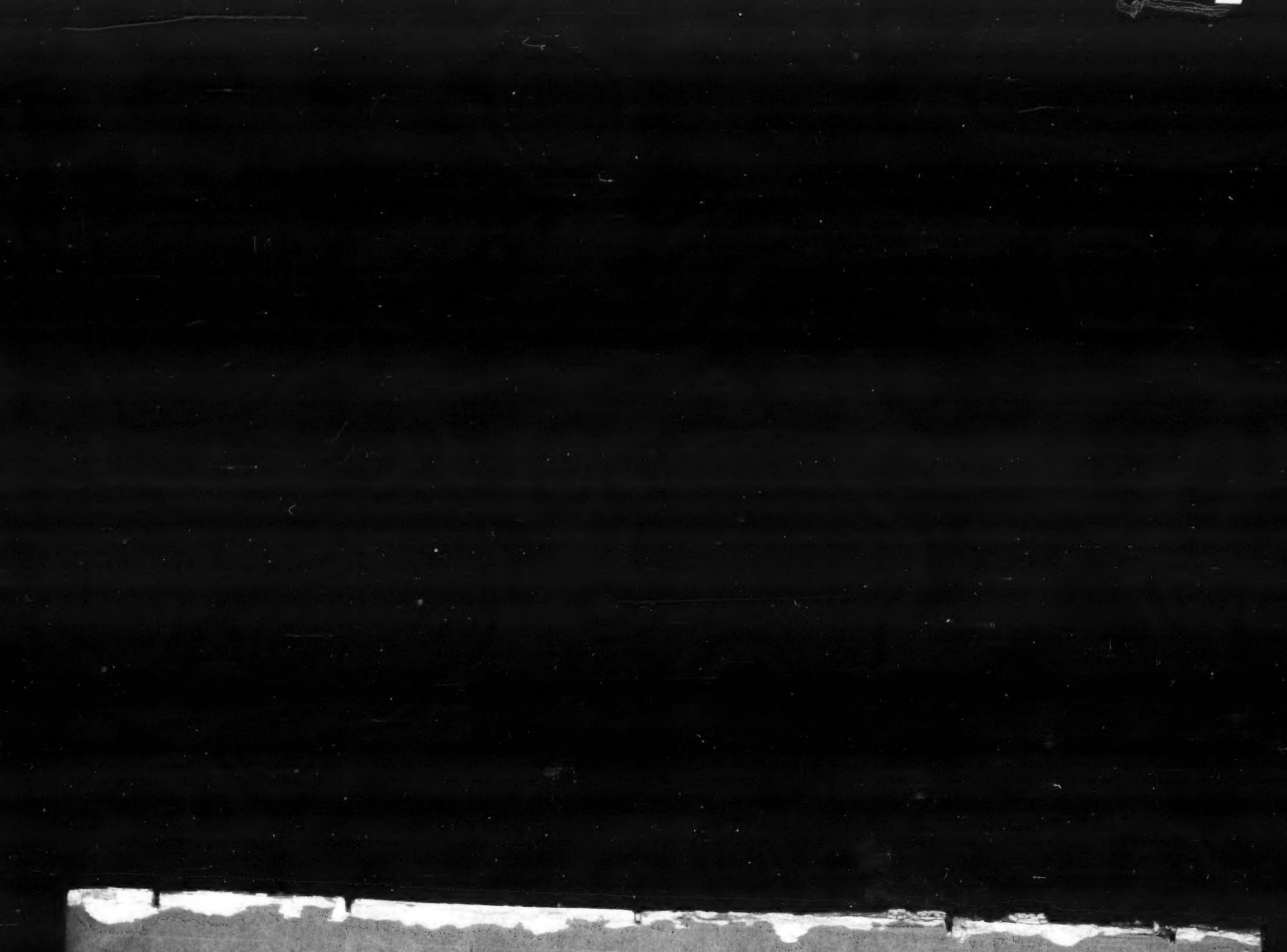
Four Horse Power. Eighteen Ton per Day. Continuous. Clean Pulp Will Sell Paper.

The Stub End

A Monthly Curse to Any Paper Maker. Read It.

The Green Bay Foundry & Machine Works

GREEN BAY, WISCONSIN



Scientific Management

WHAT IS IT?

Simply the adoption of those principles that make for increased production and economy. And in the light of our experience with economics during the War the Thrift Lessons we learned then will not soon be forgotten and Scientific Management will be practiced on a more extensive scale than ever before.

A SUGGESTION—

SPECIFY "MOORE & WHITE" PAPER MILL MACHINERY AND REDUCE THE "OVERHEAD" TO A MINIMUM

"M & W" SPECIALTIES ARE TIME—LABOR AND MATERIAL—ECONOMIZERS

BACKED BY 32 YEARS OF "KNOW-HOW"

WHICH OF THE FOLLOWING MACHINES ARE YOU INTERESTED IN?

WINDER
(2- and 4-Drum Type)
LAY BOYS
(All grades of paper)
CUTTERS
FELT GUIDES
WIRE GUIDES
PUMPS
SAVE-ALL
(Fullner Filter)
BLEACHERS
SCREENS

Ask for Full Line Catalogs Nos. 1 to 10.
Full Information Given Upon Request.

GET A PROPOSITION FROM US UPON THAT ALTERATION OR REPAIR JOB. OUR QUOTATION AND DELIVERY WILL INTEREST YOU.

The Moore & White Company

2700 North 15th Street

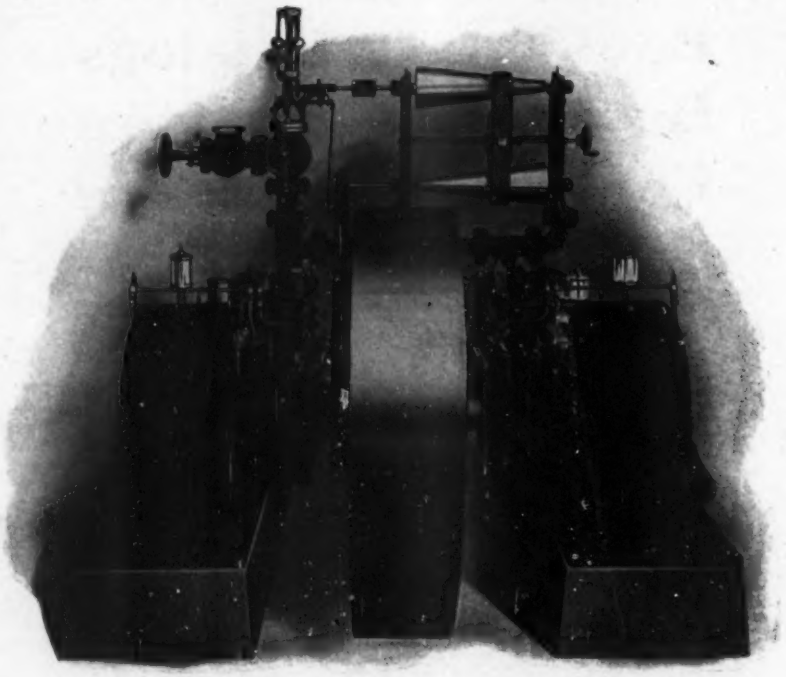
Philadelphia, Pa. U. S. A.

"Perfect Satisfaction Reported From Every Installation"

Large, Modern Designed **ENGINES**

MOST CONVENIENT FOR USE, ADJUSTMENT AND CARE

well describes the "ERIE" double variable speed engines. THEY WILL REDUCE YOUR COST by giving uniform production at all desired speeds. Prompt deliveries, reasonable price.



TO THE PAPER MILL TRADE

Substantial installations of these engines have been made in prominent mills in the Massachusetts, New York, Pennsylvania, Ohio, Michigan and Illinois districts.

Repeat orders have without exception been arranged with every user of these engines who has had subsequent requirements, and we will be glad to furnish definite references and full information as to price, delivery and equipment to meet your requirements, and will appreciate an opportunity to furnish these details by mail and the privilege of personal interviews being arranged.

Manufactured by

ERIE ENGINE WORKS, ERIE, PA.

ESTABLISHED 40 YEARS

Special Sales Representatives:

New York—W. B. Connor, Inc., 90 West Street.
Boston—Schumaker-Santry Co., 141 Milk Street.
Chicago—E. E. Maher, 818-819 Michigan Boulevard Bldg.

PAPERS

For

Books :: Catalogs
Broadsides Flyers
Folders & Circulars

Liberty	Coated	Book	Equator Offset
Crystal	"	"	Meridian "
Elite	"	"	Silverleaf Coated Bond
Velvet	"	"	Opacity, English Finish
Ultimate	"	"	Opacity, Super "
Radium	"	"	Light Weight Catalog

Competent Selling Organization in all Important Printing Centers

Mills from Maine to Minnesota. Complete Stocks for Immediate Shipment

Send for Samples and Prices

SEAMAN PAPER COMPANY
Paper Manufacturers
CHICAGO
208 So. LaSalle St.
NEW YORK
200 Fifth Avenue
St. Louis Minneapolis Milwaukee Buffalo
St. Paul Philadelphia Cincinnati

GRAVER

QUALITY-PRODUCTS *and* QUALITY-SERVICE

Water Softening & Filtration Plants *for* Paper Mills

Paper mills need soft water. No matter what your water conditions may be, one of the various types of Graver Treating Plants will meet your exact requirements.

Soft Water Means Better Paper at Reduced Cost

A Graver water softener in your mills means a big saving on sizing, color, alum, bleach and other chemicals. It prevents foaming. Treated water lengthens the life of the felts and Fourdrinier wire and makes frequent changing unnecessary. Treated boiler feed water, also, keeps your boilers free from scale and generally increases plant efficiency. A Graver plant pays for itself many times over.

Bartlett-Graver Combined Water Softener and Heater

Frequently it is advisable, because of the chemical compounds found in the water, to heat it before treating. Where such a condition is found, the Graver plant combines heating, treating and filtration in one operation. The combined softener and heater makes unnecessary the installation of an expensive water heater to be used in connection with the softener. It utilizes exhaust steam and effects a big saving in coal. No additional labor is required. The plant functions automatically. The Graver combined treating and heating plant is giving satisfaction in the scores of plants where it is in use.

Send a Sample *of* the Water at Your Mill *for* Free Analysis

The Graver water purification department will gladly make a free analysis of your water conditions and submit to you a comprehensive report showing exactly what can be accomplished in your particular case, the cost of a treating plant, cost of operation, etc. Send for a data blank and instructions for sending a sample of water for analysis.

JUST MAIL THE COUPON

WM. GRAVER TANK WORKS
4814 Todd Avenue East Chicago, Indiana

Name .....

Company .....

Address .....

.....

for An Extremely Heavy Weight Folding Enamel

Your Best BUY Is

Faultless Folding Enamel Cover

Its Embossing Qualities Are Second To None

Our New Sample Folder Will Please Your Customer

Bermingham & Prosser Co.

Kalamazoo, Mich.

Chicago New York

WE-FU-GO AND SCAIFE

Scientific Water Purification SYSTEMS

SOFTENING *and* FILTRATION
FOR ALL PURPOSES IN THE

PAPER MILL

SCAIFE'S METHODS, EQUIPMENT
AND SERVICE INSURE RESULTS

Catalogue and Special Literature
Sent Upon Request

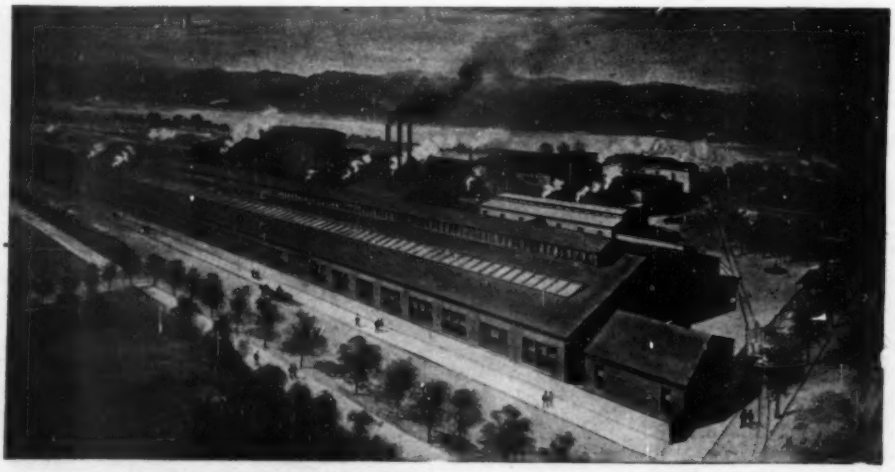
WM. B. SCAIFE & SONS CO.

FOUNDED 1802

PITTSBURGH OFFICE
First National Bank Building

OAKMONT, PA.

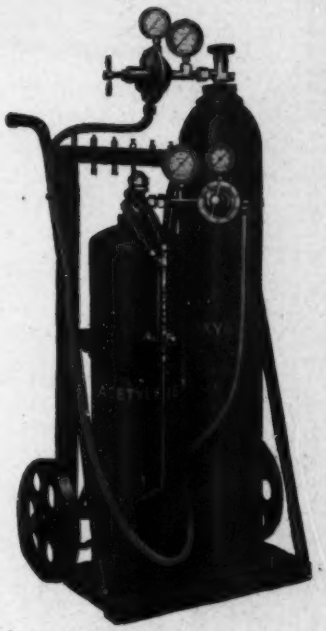
NEW YORK OFFICE
26 Cortlandt Street



WORKS—OAKMONT, PA.

FIRST AID TO MANUFACTURERS

¶ Keeping the output of your mills always at the minimum of capacity, requires an efficient, practical method of overcoming forced lay-ups when machinery breaks. Waste results from old-fashioned, time-consuming methods of repairing metal parts.



No. 1 Imperial Welding Outfit with truck

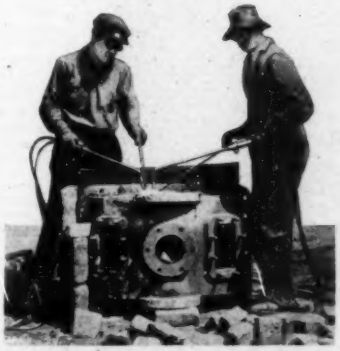
IMPERIAL WELDING CUTTING EQUIPMENT
OXY-ACETYLENE PROCESS

¶ Economical, Efficient, Safe, Speedy and Portable, Imperial Equipment can be easily operated by your mechanic and makes repairs on the spot. No costly delays need be experienced, for an Imperial Outfit welds anything in metal and cuts all wrought iron and steel.

Write today for our new catalog containing valuable data on the cost of operation, views of work performed, prices, etc.

THE IMPERIAL BRASS MFG. CO.

1200 West Harrison Street CHICAGO, ILLINOIS



Welding a broken casting with Imperial Equipment

Repairing a job quickly with an Imperial Outfit

¶ Magnify it as much as you like.

¶ Make any test you wish.

¶ Examine the warp and the woof.

¶ Run it on your machine and you will always find that

"Appleton Wires are Good Wires"

APPLETON WIRE WORKS
Appleton, Wis.

"Good Morning"

THIS is the initial issue of THE PAPER INDUSTRY. We sincerely hope that you will like it. We are as yet in our swaddling clothes, of course, and we trust you will bear with us for a while, and we hope to show before long that our heart is in the right place.

THE PAPER INDUSTRY will never contain a line of scandal, anything of a deleterious nature, in other words—loud talk. Its pages are not for the purpose of captious criticisms; its province is not to berate those in the Trade who do not agree with us, or to publish the shortcomings of anyone. It is published in the interests of the whole industry, and for everyone who has the best interests of the paper industry at heart.

We hold only the best wishes for the other publications in the Trade. They have their field, but it is quite a different one from that which we will attempt to cover. Our plan will be outlined from time to time, as it would hardly do to tell all about it here, but we shall try to meet the approval of the readers with the perspicuity with which it is edited. THE PAPER INDUSTRY is published in the hope that we may be able to be of benefit to the industry. The publisher is known from his many years in the industry, and we are just a little proud to say that in the twenty-five years that he has worked and traveled among the people in the industry, he has never made an enemy, has never done an unkind thing to anyone connected with the Trade, and sincerely hopes that he never will. If there should ever anything appear in these columns that will hurt the feelings of anyone, we wish to be reminded of it, and we will be very sorry, indeed, and will be only too glad to ask the pardon of the offended person, no matter whether he be considered great or small in the industry.

THE PAPER INDUSTRY is not published in the interests of any one man, or any set of men in the Trade, but in the hope and with the fondest desire that we may be able to furnish material for serious thought which may help those in the industry to do their work better, to make paper a little better at a little less cost, and to disseminate information that may be of great value to everyone in the industry.

To make THE PAPER INDUSTRY what we would like to have it, and what you would like it to be, we will need the help and good will of everyone in the industry, and we sincerely hope we will have it. If we do, then we will strive all the harder to be of service.

The great industry of making, selling and printing of paper is not a Trade, but the best of all American industries, with the biggest and best men in America in it, and we beg to be,

Your Humble Servant,

THE PAPER INDUSTRY.

Roberts Steel Shell Burrs

are guaranteed to give the wear YOU EXPECT a burr to give, or are replaced without charge.

The steel for our burrs is made to a certain definite analysis, and is given a certain definite heat treatment.

This results in a uniform hardness.

When we ship a lot of burrs we KNOW how they will wear.

That's why we can guarantee them as we do.

No charge for Holders.

The Roberts Automatic Dressing Machine

Gives a Predetermined "Dress" to Wood Pulp Stones

THIS means more pulp, better pulp, less waste, more uniform production and the elimination of the most disagreeable job in your mill.

By a single movement of the valve lever, the burrs move up to the stone, take a certain amount of pressure, stay there for an indicated time and return to their original position.

This operation may be varied through any range of pressure, any length of time, and any style or cut of burr may be used.

When you have determined the correct method of dressing any particular stone, it can be duplicated by the most unskilled man in your mill.

The burr extends across the entire face of the stone, consequently there are never any high spots or ridges to make sliver.

The stone dressed with this machine **must** run absolutely true at all times.

Both the time and pressure elements controlling the action of the burr can be changed instantly, permitting **any** variation in dress necessary to obtain any desired result.

The burr is always perfectly parallel with the surface of the stone—this, and the elimination of the transverse motion of the burr across the stone practically doubles the life of the burrs.

This method increases the life of the stone and the very small amount of waste gives the highest percentage of pulp from the amount of wood ground.

We would be very glad to receive your inquiries and assure you they will have our best attention

Roberts Manufacturing Company

LOCKPORT, N. Y.

EDITORIAL

A prominent mill manager, when asked to define the best method to produce a good sheet of paper, replied as follows:

"Take a small amount of fibre, add to it a large amount of power, an enormous amount of water, some machinery, and a pinch of chemicals; mix all these ingredients with some brains, and you have a good grade of paper—the more brains the better the paper."

The superintendent is the most important cog in your executive machinery; he is the man who controls the actual paper-making processes that convert your raw materials into the finished product; he must have the proper mental equipment to enable his staff to produce the desired quality of paper, otherwise all your up-to-date equipment, scientific control, correct purchasing methods and intelligent inspection will still yield an inferior product.

Your success or failure depends upon how much brains your superintendent can pass on to his force to mix with the raw material. Then why not give him an opportunity to develop the principal ingredient of your paper, so that he may have enough supply on hand to pass on to his organization?

If we trace the progress of any American industry we find the great strides forward that have been made are due to the 'get-together idea.

The innumerable difficulties besetting our industries during the war period were overcome through the means of this same idea, and it now gives us the courage to face the present trying period of readjustment with equanimity.

It is the same idea that has given you the light of commonsense to see your competitor by, and the moral strength to treat him as an associate instead of an enemy.

It has destroyed your skepticism in "New Ideas" and has directed your activities along such ethics and principles that it has placed the industry on the road to the high plane it deserves.

The business end of the industry is well organized into a "get-together" association, and the technical men, after more or less opposition have organized an association. Both of these organizations have accomplished wonders in the development of the industry.

The superintendent cannot benefit from the business associations because his problems are not discussed, and he does not benefit from the technical associations because in only a few exceptional instances is he a technical man. Then why not form a superintendents' association, where the problems of paper manufacture from HIS viewpoint may be discussed and ideas for their solution exchanged?

The practical men in any line of endeavor are the foundation of the whole business structure. The pulp and paper mill superintendents are the foundation upon which the paper industry rests, and it is only through their coöperation that your progressive ideas can be brought to fruition.

It is the purpose of this Journal to publish all the technical news on paper in the language of the practical man, and with the coöperation of the managers and owners, to act as a clearing-house for the exchange of ideas among the men composing this important part of the industry, assisting with all means in our power, the organization of an association of pulp and paper superintendents.

Success depends upon teamwork. It is only by being able to "hit the line together" with perfect "interference" that real teamwork can be accomplished. Then why leave such an important part of the paper producing team go without the "hit-the-line-together" association, where he may meet with his kind and exchange ideas for the further development of the paper industry?

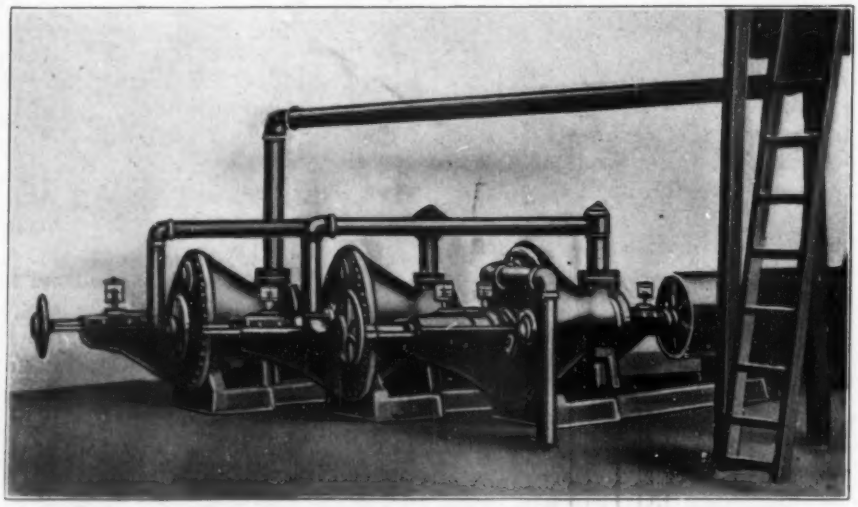
Let us then suggest that there be formed an organization to be known as the American Paper and Pulp Mill Superintendents' Association. That there be a meeting of the eastern superintendents each summer at some convenient point in the east, and a summer meeting of the western superintendents at some central point in the west, and then a winter meeting of the whole membership at a point that will best suit most of the members—a central point like Buffalo, or Cleveland, or wherever it is thought best. It seems to us the summer meetings ought to be held at paper-making centers—those in the west at Kalamazoo, Appleton, Dayton, etc., and those in the east in like manner.

In order to get the most out of an organization of this kind there ought to be monthly meetings of local branches—that is, Holyoke, Watertown, Kalamazoo, Appleton, etc., so that these men on whom so much depends could get together and learn of one another.

We would be pleased to hear from manufacturers, managers and superintendents as to their opinion on this subject and their views. The office of THE PAPER INDUSTRY can be used as a temporary office for the formation of this needful organization.

Claflin Continuous Beaters

RUN IN TANDEM



Will handle the hardest kind of stock, direct from the cookers, and prepare it ready for the machine, without any regular Beating Engines.

Whether run in tandem or singly in connection with regular Beating Engines, they are gluttons in the amount of work they do.

The harder the fiber is to handle, the greater the results in using these machines.

On Rope Manilas, on Kraft Papers, Fibre Board, Wall Board, Leather Board or Pulp Screenings they do specially good work.

If you are not getting best results from your Sulphite Screenings, or if some of this material is wasted, you ought to let us show you what can be done with a

CLAFLIN CONTINUOUS BEATER

Claflin Engineering Co., Lancaster, Ohio

The Canadian Fairbanks-Morse Co. Ltd., Agents for Dominion of Canada

STABILIZE PRICES!

"What's the market on paper now, and what is it going to be 30 days hence!"

This is the question on the lips of every manufacturer, jobber and consumer. The question can be answered.

The answer needs the widest publicity and acceptance. Wrapping paper prices have declined from war level close to 20 per cent on the average. It has taken 5 months of stagnation to bring them down. Never have declines been so stubbornly resisted. Why?

Because mills are paying peak costs for all raw materials, cost of living is rising steadily, and labor is demanding higher wages and shorter hours, and consumers were refusing to purchase at any price.

Economically the mills were nearer right than the purchasing public who arbitrarily said, "War is over, prices will collapse. We will make money by holding back our order."

But prices did not collapse. They have come down slowly, and they are on a fair level where either buyers will accept them or mills must close down. And no mill wants to close down. Most of them desire to pay their help from four to six dollars per day, but the only way they can get the money to pay the raw material, labor and producing costs is not by low commodity price, but by high commodity price.

Raw materials are selling generally at wartime prices. Labor is receiving more than wartime wages. Wheat, corn, hogs, beef, eggs, butter and all essentials of life have risen in price since the Armistice was signed.

The index figure in November for living prices was 281; last week it was 311. The general commodity price a year ago was 227; last week it was 217—a decline of about 4½ per cent.

But paper prices have declined on the average nearly 20 per cent. Will there be further decline in paper prices now? **There will not.** Paper prices will go higher before they go permanently lower.

Already healthy conditions are making for an advance on May first. One of the largest producers of both sulphite and sulphate pulp and paper on this continent notified all their converters, in accordance with their contracts, that effective May first prices on both sulphite and sulphate grades would advance one-half a cent a pound.

It is now fifteen days since that notice hit the trade. It has had a definitely stabilizing effect. The weak spines of catch-as-catch-can manufacturers have stiffened, and jobbers who didn't "believe there was any bottom to this market" have suddenly found an underlying stratum of strength.

Prices are stabilizing at and about present levels. As evidence we quote part of a letter we were privileged to see, written by a large representative mill to one of their large customers. The customer had written complaining that some other mill in their neighborhood had cut the price recently on the same grade of paper as the mill in question was making, and in strong language pressed the request that the mill meet the competitor's quotation:

> "We have your recent letter and note what you say about conditions in your market, and we are mighty sorry that they are so, but there is nothing we can do at present to change them.
>
> "The one need of the industry today is stabilization of prices. That means that we and all other mills must quit price cutting, and you jobbers should discourage it.
>
> "We refuse to make a concession in price under any circumstances, and we believe that by setting the example other mills will follow.
>
> "If mills and jobbers co-operate now we will have some good paper business the remaining seven months of the year; otherwise not."

That is the nub of the whole situation.

Stabilize prices or no one gets any profitable business.

Economically and financially the situation is sound.

Stabilization means cessation of senseless price cutting.

Price cutting is butchery of the industry.

What is needed, therefore, is to stop the wanton butchery of one of the finest industries on this continent.

The Paper Industry stands always for all those things which build up its industry. We are dead against the slaughter of it.

We call now on every mill, jobber and converter of paper in the industry, to co-operate one with the other and all together for the stoppage of this silly, ruinous, unprofitable business-scuttling practice of competitive price cutting.

Don't ask the other fellow to stop it. Quit it yourself.

VICTORY

Is always yours when you enlist our services to combat your problems

VALLEY IRON WORKS CO.

Here are our Combat Forces, marshaled for your inspection, prepared to conquer your Problems

Vesuvius Oxidizing Sulphur Burners.
Beating, Washing and Bleaching Engines.
Barkers and Barker Attachments.
Chippers, Re-chippers, Chip Screens.
Knot Screens (Revolving).
Diaphragm Screens—Felt Washers.
Marine Engines.
Deckers (single and double).
Stuff Chests (Vertical and Horizontal).
Shredders and Special Washers for Old Paper Stock.
Wet Machines and Patent Roll Skinners.
Bronze, Semi-steel, Lead and Iron Castings.
Centrifugal Pump, Etc.

BLOW PITS, ACID TANKS

VALLEY IRON WORKS COMPANY

APPLETON, WISCONSIN, U. S. A.

WATERONS ENGINE WORKS, Brantford, Ontario

Vol. 1—No. 1

THE PAPER INDUSTRY

PETER J. MASSEY
Editor

THE MONTHLY EDUCATIONAL JOURNAL
Devoted to the Interests of The Paper Industry

CONTENTS

FOR APRIL, 1919

		Page
With the Publisher		9
Editorial		11
Stabilize		13
Illumination	*H. T. Spaulding*	16
Water Waste in Papermaking	*F. F. Vater*	22
The Individual Unit Drive	*Wm. Nash*	24
How We Moved a River to Build a Mill	*W. H. Scott*	25
The Value of Waste Paper Stock in Papermaking	*Ed. T. A. Coughlin, B.S., Ch.E.*	28
Advantages Gained by Electrifying a Mill	*D. H. Colcord*	31
Water Purification	*M. F. Newman*	34
Duties of a Machine Tender	*Paul Smith*	37
Difficulties Encountered with Printing Papers	*Peter J. Massey*	38
The Analysis of Satin White	*Harry C. Bradford*	40
Woodroom Practice	*O. L. Berger*	41
Use of Air in the Paper Mill	*M. C. J. Billingham*	45
Chips of Information		46 to 66

Safety Gate for Winder, Fire Prevention, Safety First Inspectors, Safety Always, Machine for Wrapping Rolls, A Compact Package, Walks and Roadways, Do You Use Kerosene Oil, Painting by Power, Hitch for Felt Stretch Roll, Lighting the Mill, Self-Locking Chuck, Mill Saved by Siren, Hardened Steel Cutter, New Defibring Machine, New Ash Pit Door, Pocket CO_2 Indicator, Prevent Belt from Slipping, Latest Papermaking Patents, Handling and Piling System.

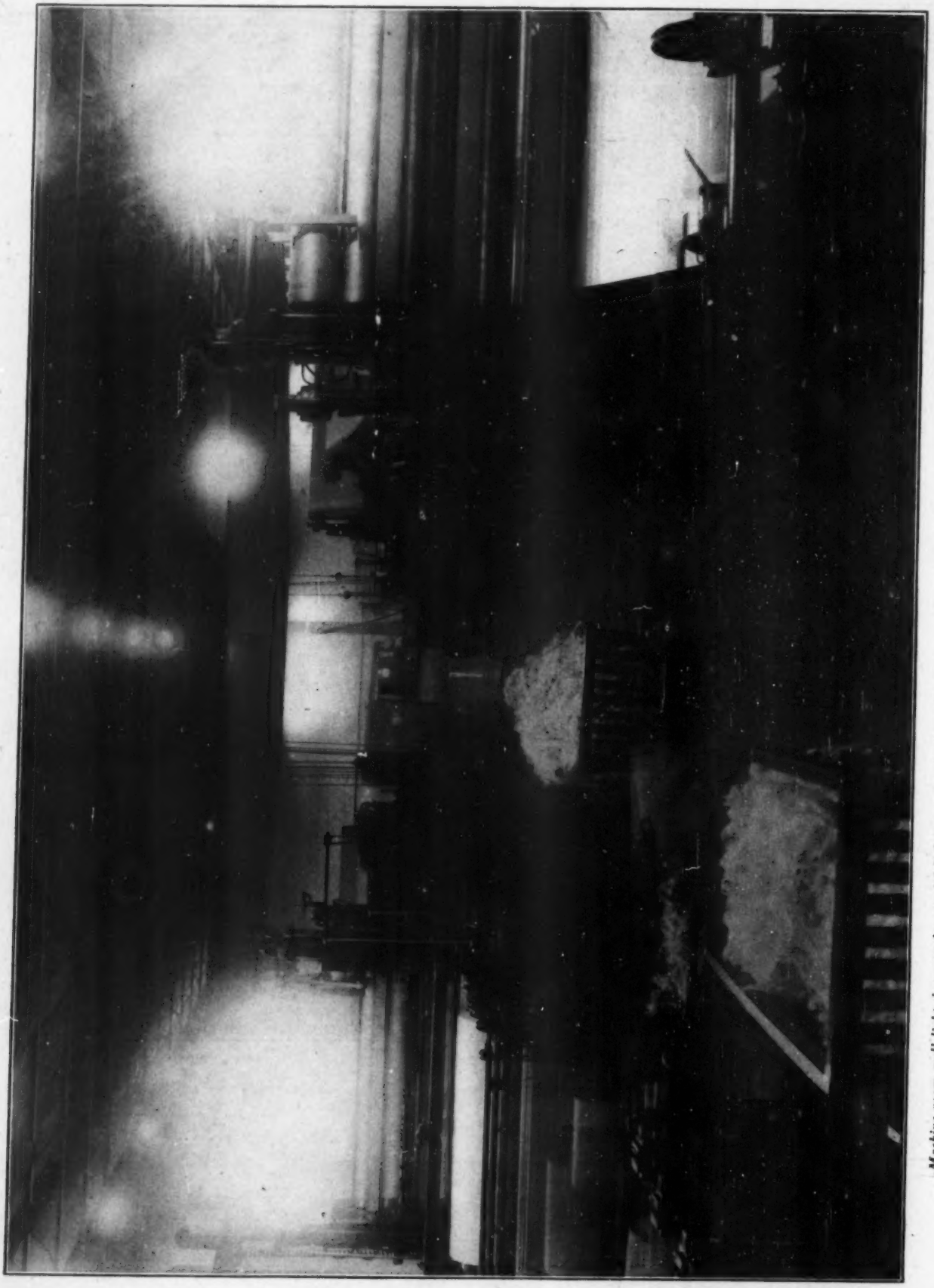
Markets		67 to 76

TERMS: To. U. S., Alaska, Hawaii, Philippines, Porto Rico, Cuba and Mexico the subscription price is $2.00 per year. Canada, $2.50. Other countries, $3.00.

Copyright 1919, *by*

EDWARD B. FRITZ, Publisher

501 Monadnock Block Chicago, Ill., U. S. A.



Machine room well lighted except for special lighting over calender rolls where unsatisfactory shielding of large Mazda C lamps results in extreme direct glare

THE PAPER INDUSTRY

"The Educational Magazine for the Paper Industry"

Volume I APRIL, 1919 Number 1

ILLUMINATION

For the Paper Mill

By H. T. SPAULDING

Engineering Department, National Lamp Works

[This article is part of a series, by one of the leading authorities in the new engineering science, that has developed and reached maturity in the last five years. After having made an exhaustive study of the lighting requirements in paper mills, he is offering you the results of applying Illumination Engineering to the paper mills. To every mill which has not as yet had its lighting requirements engineered, these articles will be invaluable.]

IN plants where any considerable proportion of the work has to be carried on under artificial illumination, too much attention cannot be given to seeing that this artificial illumination is the best that can be obtained. Not only is this necessary in order to reduce accidents, to provide more comfortable and sanitary conditions for the workmen, and to eliminate the so-called "tiring effect" of working under artificial light, but it is of direct advantage to the manufacturer, in increasing and improving his output, reducing his liability due to accidents, and in solving to an extent the labor situation by keeping employees satisfied and contented. Therefore, in a paper mill, where the nature of the work is such that much of it must be carried on continuously during the twenty-four hours, it is particularly important that ample care be taken in the design and installation of the lighting system.

It is the purpose of these articles to give such information as will be of value to the paper mill superintendent or manager in determining if his present lighting is adequate, and if not, in assisting in the choice of what is to be installed, and the method of its installation. These data naturally fall under three heads, viz.:

First.—General requirements of any satisfactory industrial lighting installation;

Second.—The equipment available and the factors governing its choice;

Third.—The particular application of the principles of good lighting to paper mills.

Part 1—Requirements of Good Illumination

The requirements which must be met in the choice of reflecting equipment and in the design of a satisfactory lighting installation for industrial plants are:

1. A steady light of sufficient intensity on all working surfaces, whether in horizontal, vertical, or oblique planes;
2. A comparable intensity of light on adjacent areas and on the walls;
3. Light of a color and spectral character suited to the purpose for which it is employed;
4. Freedom from glare and from glaring reflections;
5. Light so directed and diffused as to avoid objectionable shadows or contrasts of intensity;
6. A system which is simple, reliable, easy of maintenance, and reasonable in initial and operating cost.

Complete satisfaction cannot be expected from an

installation in which any one of these requirements has been neglected. Many manufacturers have taken advantage of the abundance of light obtained from the high-power incandescent lamps to duplicate daylight conditions in their plants, but others, either through carelessness or ignorance, have given no thought to the choice of proper reflecting equipment and installation. Naturally, such practice is not only wasteful of light, but the glare from the unshielded lamp filaments defeats in large measure the effectiveness of the system and, in fact, may prove to be a positive menace to the safety and eyesight of the personnel.

Light on the Work

If artificial light could be had for the asking, no plant would be content with a lower standard of illumination by night than by day. Obviously, the minimum intensity to be supplied is that which will permit comfortable vision, conserve eyesight, and eliminate accident hazard. Many states, through their industrial commissions, are beginning to require the employer to make such minimum provision. Intensities for various classes of operations are specified, depending on the nature and fineness of the detail to be observed, the closeness of application required and the reflection factor of the working surfaces. These intensities are designed merely to protect the operative who must work for long hours under these conditions day after day. The following table gives the values determined upon by one State Industrial Commission for the minimum foot-candle* intensity allowable, and also the intensity desirable in the various paper manufacturing operations.

Operation	Minimum intensity	Desirable intensity
Beaters	1 foot-candle	2- 6 foot-candles
Calendars	2 "	3- 9 "
Machine	1 "	2- 6 "
Grinding	1 "	2- 6 "
Finishing	3 "	4-12 "
Cutting	3 "	4-12 "
Trimming	3 "	4-12 "

However, these governmental requirements as to minimum allowable intensity, are not such as to assure the most economical production, a factor of vital interest to the manufacturer, and to obtain which considerably higher intensity values are found necessary. It is difficult to recommend the exact intensity required in a given plant from the economic standpoint. This figure necessarily depends upon numerous factors, such as the cost of producing light, the number and wages of the employees, and the value of their output, all of which vary widely in different establishments.

For good vision, the color and fineness of the materials worked upon are important considerations in determining the amount of light which should be supplied. An object is seen by the light which it reflects rather than by the light falling on it; hence those mills working with colored papers require higher intensities than those in which only white is manufactured. Work involving fine detail or close application requires more light than operations where a comparatively lower standard suffices. The greater alertness and better morale of the workmen in brightly lighted surroundings is at once reflected in the greater production of the plant.

There is a growing conviction that no one should be called upon to work continuously at any occupation under an intensity of less than one foot-candle, regardless of how rough the operation may be. It is a notable fact that in those factories in which the most study has been devoted to lighting, the highest intensities have been adopted, based upon the experience that each increase has led to still more economical production.

In a consideration of the amount of light necessary for factory illumination, the criterion must be the intensity on all working surfaces, whether in horizontal, vertical, or oblique planes. At one time, consideration was largely confined to light on the horizontal; yet most factory work involves the perception of objects in their three dimensions, and the illumination of all surfaces is important.

Illumination of Surrounding Surfaces

Moderate intensities of illumination in aisles and other spaces intermediate between the working surfaces, on the walls, etc., are necessary to safety, good vision, and a stimulating atmosphere. Light side walls are conducive to a cheerful impression of brightness throughout the room. Sources which direct considerable light to the vertical planes, and light wall colors, aid materially in accomplishing this.

The eyes of the workman looking up from his well-illuminated work are not adapted for vision at low intensities; hence, if adjacent objects and aisles are only dimly lighted, he will be compelled either to grope about, losing time and risking accident, or to wait until his eyes have become adapted to the low intensity. Glancing back at his work, he again loses time while the pupils of his eyes adjust themselves to the increased amount of light which reaches them. If long continued, this condition leads to fatigue as well as to interference with vision and to accidents. The general illumination of all intermediate and surrounding areas should be sufficient to allow no marked contrast with the brightness of the working surfaces.

It is considerations such as these that have led to the almost universal adoption of the general or overhead system of lighting in modern industrial plants; they also constitute the strongest arguments for the use of translucent reflectors.

(Continued on page 20)

*A foot-candle is the intensity of illumination on a surface normal to the light rays at a distance of one foot from a source of one candlepower.

164932

APR 16 1921

Good lighting over machines with satisfactory reflector and spacing. Insufficient illumination of surrounding areas, resulting in extreme contrast as operators look up from work

The light coloring of walls and ceiling and a clean floor result in a satisfactory illumination of the upper areas of the room and a consequent cheerful appearance, although opaque reflectors allow no direct light to reach the ceiling

Insufficiently shielded lamps of large size cause serious direct glare, and a small number of lamps results in dense shadows between beaters

Color Quality of Light

As daylight intensities represent the standards which are to be sought in the artificial lighting of industrial plants, so does the color of daylight constitute the standard which should be approached in artificial illumination. Through centuries of use the human eye has adapted itself to function best within the range of color which is found in natural light, and light within this range will also be found most pleasing and stimulating.

Color discrimination forms one of the most important aids to vision. It defines outlines and edges and serves to identify objects which may be similar in other respects, such as form, texture, and reflection factor. The ideal illuminant therefore emits rays of all colors. While the exact proportions are not the same, still, all of the colors in daylight are contained in the light emitted by incandescent lamps, and objects retain their natural appearance when viewed under this light. A lamp with a specially selected blue-green bulb is available which gives a light which is a further step toward daylight color and extremely valuable in those locations where close color identification is important. For color matching, where extreme accuracy is required, several equipments with special absorbing screens are available which duplicate the standard north-sky light with exactness.

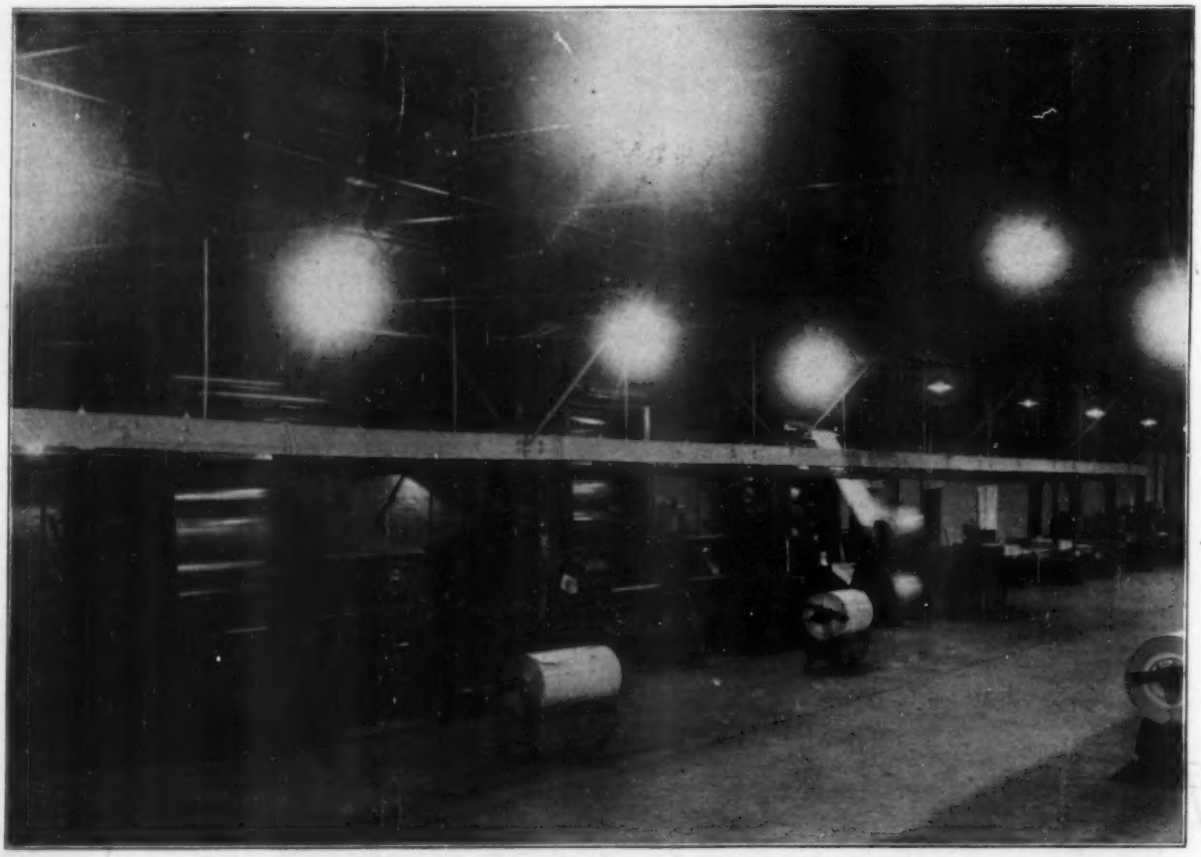
Glare

Glare has been defined as light out of place. It has also been more fully defined as brightness within the field of vision of such a character as to cause discomfort, annoyance, interference with vision, or eye fatigue. Either definition establishes the fact that glare is undesirable.

The degree at which glare is experienced depends upon six principal factors:

1. Total candlepower from the source directed toward the eye;
2. Distance from the source to the eye;
3. Intrinsic brilliancy of the source;
4. Contrast in brightness between the light source and the working surfaces and surroundings;
5. Proximity of the light source to the line of vision;
6. The length of time during which the source of glare is present within the field of vision.

It is a matter of common experience that of two sources of equal candlepower, that which has the greater intrinsic brilliancy or candlepower per square inch is the source of greater discomfort. Too fre-



Reflected glare from polished calender rolls and even from the rolls of paper is extremely undesirable. This can be eliminated by frosting the lamps or by other means of diffusing the direct light from the lamps

quently, however, the consideration of glare is assumed to be entirely a question of intrinsic brilliancy. Of greater importance than this is the question of total light flux entering the eye. Tests have shown that a 10-inch opal globe equipped with a 500-watt Mazda C lamp hung approximately 10 feet above the floor and 10 feet from the observer, will prove fully as glaring as a bare 75-watt Mazda C lamp in the same location. Although the intrinsic brilliancy of the opal globe unit is only two or three times that of a candle flame, its total candlepower—hence the quantity of light which reaches the eye at this close range—is so excessive that its effect is just as bad as that of the filament of the lower candlepower Mazda C lamp which has an intrinsic brilliancy 400 times as great as that of the globe. On the other hand, the same 500-watt unit at twice the mounting height might be entirely unobjectionable because of the greatly reduced quantity of light which would then reach the eye.

Contrast also has a considerable effect in causing glare. An unshielded Mazda lamp hung over a bench near a window causes no glare when viewed against the background of sky by day, yet the same source contrasting sharply in brightness with its background at night will be the cause of extreme discomfort, accentuated by reason of the fact that it is close to the line of vision. The afternoon sun has only a fraction of its noonday brightness; nevertheless, on account of its proximity to the horizon, it is much more likely to be glaring.

Some sources which are not immediately recognized as glaring may cause fatigue when within the field of vision for a considerable period of time. The effect of looking out of a window for a moment is usually not at all unpleasant. But working all day at a desk facing the same window would be decidedly tiring.

Specular Reflection

Wherever highly polished surfaces are present, the reflected images of a light source as seen in these surfaces are more likely to be a cause of discomfort than the lighting units themselves. Glare caused by specular reflection from working surfaces is particularly trying because of the necessity of directing the eyes toward those surfaces, and further, because the eyes are by nature especially sensitive to light rays entering from below. In choosing lighting equipment, it must be borne in mind that although a given reflector may afford adequate protection against direct glare from the lamp filament, it will not protect against glaring reflections unless the lamp is shielded in such a manner that the filament cannot be seen when the unit is viewed from directly beneath. In many operations, including the inspection of finished surfaces, a moderate degree of specular reflection or sheen will be found essential.

Shadows

Differences in brightness of surfaces, that is, light and shadow, are essential in observing objects in their three dimensions. Without such differences, except as variations in color are present, no outlines, edges or contours would be defined; one could not tell whether an object were rectangular or circular in cross section, whether the faces were flat, convex, or concave. On the other hand, in the factory it is usually necessary to work with surfaces in many planes; hence while dense, sharp shadows would define edges and outlines most distinctly, they might also be so dark as to interfere with work in the shaded areas.

From successful trials of indirect lighting in offices, some factory managers have drawn the conclusion that the indirect system is ideal for all locations, and that it is simply the matter of operating cost and maintenance which has prevented the universal application of this system. However, the distinction must be recognized that in offices close scrutiny is limited to plane surfaces and that printed words and figures are rendered legible by differences in color and contrasts in brightness with the background, and here specular reflection and shadows are of no aid to vision, but usually do harm.

For satisfactory general illumination in industrial plants, there must be no shadows so dense as to make vision difficult where the direct light from one or two sources is cut off, nor so sharply defined as to cause confusion between a machine part and its shadow. In general, lighting should be so designed that shadows are present, but they should be soft and luminous.

To sum up, then, the ideal source of illumination for paper mill use must be low in brilliancy to minimize glare and specular reflection, and must distribute the light in a manner to supply satisfactory illumination on the vertical as well as on the horizontal. It must be sufficiently large in area to give soft shadows, and in most cases must be small enough to insure a directed light. Reflecting and diffusing equipments of many characteristics are available to produce with Mazda lamps some or all of the above qualities in any degree required.

Water Waste in Papermaking

By F. F. VATER

[When you take into consideration that every pound of paper during the course of manufacture comes in contact with approximately 100 gallons of water, its waste should be very seriously considered. The author treats his subject from one of the angles which perhaps you have overlooked.]

LARGE quantities of water are used in making paper. Generally, wherever large quantities of anything are used, wastes creep in, and unless these wastes are stopped, costs run up.

The fact that you need quantities should make you careful, because, pumping water costs money. It does not mean much money if a few gallons only are wasted, but if a few gallons are wasted each minute of 24 hours a day for 300 days in a year, it runs into many dollars.

Wasting water oftentimes means waste of heat also, and it is by no means a difficult matter in this item alone of increasing the coal consumption from 1¼ lbs. of coal per pound of paper to 1½ or 1¾ lbs., and this hurts when the balance is struck.

I believe there are few mills in this country who can tell you what it costs to pump their water, and it is an item of cost it will pay you to ascertain.

If a mill uses 2,000,000 gallons a day, it does not sound large to a papermaker, but nevertheless it is more water than is used for every purpose in a city of 7,000 people.

The Waste of Coal

Two million gallons of water weighs 16,666,660 pounds with a suction lift on your pumps of 12 ft., and you discharge to an elevation of 35 ft., the total head pumped against is 47 ft. Pumping this weight of water to this height requires 16½ h. p., and if your pumps are motor driven and well designed, the combined efficiency of pump and motor will approximate 50%, so that the horsepower delivered to the motor will be 33.

With the present cost of coal and labor, you are doing well if you are making a horsepower per year for $100.00, and as your pumping requires 33 h. p., it is costing you $3,300.00 a year. This is only pumping to the low elevation and does not cover pumping the large quantity required for your sprays at the higher pressure.

If, of this two million gallons, 750,000 is used at the paper machines where the head you pump against is practically doubled, your pumping cost total will be $4,537.50 a year.

The Waste of Steam Energy

It is a moderate-sized mill that pumps as little as two million gallons a day. The larger the mill, the greater the cost. If you can save 5%, 10%, or 20% of this cost, it is worth a little trouble and a little watching. It is worth while to know what a horsepower cost would produce, and it is worth while to know that your pumps are efficient and are not showing a combined efficiency of 20% instead of 50%.

After your water is pumped, it is generally filtered. Filtering adds to the cost of your water. Many of your filter plants are not modern, and the cost of clarification is high. I have seen many cases where the coagulation cost alone reached $8.00 a million gallons. It should not cost you more than $1.00 per million gallons.

The Gravity Filters

Paper mills have largely installed gravity filters whether they were right from an engineering standpoint or not. The question as to whether you install pressure or gravity filters is a question of duplication in your pumping.

If your water supply is high enough to flow into your filter beds, use the gravity type, as you can pump from the clear well directly into the mill. If, on the other hand, your water is below the filters, you should use the pressure type of filter, because you can handle your water with one pumping.

I have in mind a case where this misapplication of gravity filters is costing a mill $3,600.00 a year.

The Pressure Filters

There is an impression that a gravity filter will do better work than a pressure filter, but this is not true. The reason this impression exists is that the gravity filter cannot be clouded and a larger filter bed area would be provided than if pressure filters were used. This is wrong. If in the gravity filter you pump 2½ gallons per square foot of filter bed area to your filters, and if with a pressure type you pump 3 gallons of water per square foot of filter bed area, the result will not be the same, but if both systems are designed to pass the same volume of water per square foot, the result would be identically the same.

Waste of Plant Water

One serious waste of water in a mill is the failure to save the plant water. Millions of gallons are thrown away yearly.

I have been in the machine room of a mill and seen

three or four 2-inch hcse connections wide open, wasting a 2-inch stream of water that has cost you money to pump. Why not equip your hose with automatic, self-closing cocks? They will save enough power to pay for themselves in a very short time.

Hard Water

All western and southern mills face a condition that must change. They are trying to make high-grade papers with hard water. You can't do it. In the eastern mills where the highest grades of paper are made, they use exclusively a soft water, practically free from lime, magnesia, and sodas. It is impossible to filter a water the turbidity of which is constantly changing and deliver a perfectly clear effluent. If you are to turn out an absolutely uniform quality of paper, you must have a uniform quality of water to make it with.

Many of you are troubled in matching colors. I have seen tons of paper rejected because it was off color, and it had to be thrown back into the beaters to be worked over. This trouble and expense can be overcome by using a water of uniform quality. That means a water of uniform hardness and uniform color. This can only be obtained by softening the entire mill supply.

Benefits Derived from Soft Water

It is going to cost from $30 to $50 a million gallons to soften your water, and your first impression may be that it is not justified. I think an investigation will probably change your mind. I have seen many an order for paper placed at a higher price because the mill produced a uniform color. The white papers *were white;* there were no dirty specks in them; they were uniform.

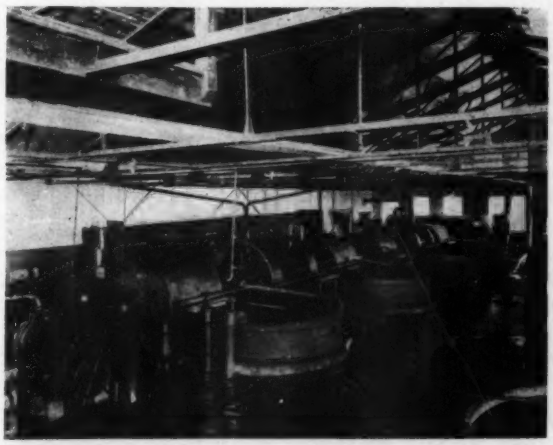
The use of a softened water will reduce the amount of color you have to use. The colors will be uniform. No time will be wasted in an effort to match them, and no stock will be rejected and have to be worked over.

While the saving in cost of color, saving in time spent matching color, saving of running paper off the machine to have it rejected may not offset the cost of softening, there is another vital matter to be considered. Whether it would or not, one certainly exists. If you can advance the price of your paper one-fourth of a cent per pound because it is intrinsically worth that one-fourth cent more, the investment in a water softening equipment will pay you handsome dividends.

Filtration a Failure

I predict that you are facing this proposition now; that your brother papermakers are considering and investigating the question now; that you will either get into line or be a trailer. Therefore, begin to watch the water consumption all over your mill; stop wastes; insist on economy; save your waste water and keep the cost of softening down as much as you possibly can.

I reiterate that filtering has failed. I think every one of you know it, and know that your water varies in color in spite of filtration, and it also varies in hardness. Softening is the perfect cure and will pay.



To wash down a beater room floor it does not necessarily have to be flooded, as this is one of the many ways in which water and power is wasted

The Individual Unit Drive

By WM. NASH

[A practical paper mill man, superintendent of a mill manufacturing a large variety of papers, gives you, from the practical man's point of view, the advantages of the individual unit motor drive.]

THE requirements of the time for more production with the same amount of equipment have led to the adoption by a considerable proportion of the paper industry of the electric drive. Its popularity is increasing so tremendously with the practical paper mill men that the near future will see its universal use.

The Proper Application

Every application of motors to paper making machinery has its own peculiar characteristics, so that in the analysis of motor requirements each type of machine and the class of manufactured products must be given consideration. With experience has come enlightenment in the motor's proper installation and use. This has brought about, to a large extent, the displacement of the original group drive idea by the individual motor unit. Especially is this true in the grinder and beater rooms where it allows a simplified arrangement of the grinders, Jordan and beater engines, with economical power consumption and perfect control of the grinding and beating processes.

In the case of a mill having an output of standard paper running continuously without variation, the group idea applied to its grinding and beating operations may be the correct principle due to the doubtful saving of horsepower, but in the case of a small mill or any mill making specialty papers necessitating variable beating and grinding conditions, the individual motor control with a power consumption recording system is the proper thing.

Economy in Power Consumption

Greater economy is attained through this subdivision of power application, as it permits the starting or stopping of any unit without interfering with another, eliminating the friction loss thru belts, gears and other power consumers. The individual drive also allows any additions to your equipment, without interfering with their installation, in any part of the mill that may be suitable to your requirements, and gives you good light and better working conditions, which raises the morale of your organization and makes them better and happier workmen.

The choice of motor units should be very carefully made, using a temporary motor with recording instruments to determine the size and type. This will prevent errors, saving much time and expense in their correction later. The chief error made in selection of motor units is too large a unit for duties to be performed creating a source of waste energy. A unit large enough to carry the maximum load is all that is necessary, as all motors are at least 25% more efficient than specification.

Control of Processes

The individual motor unit principle applied to the grinders allows the production of uniform pulp of any predetermined quality through the perfect control of the speed, which is the chief factor in the quality of fibre produced.

The installation of power consumption meters on each unit is indispensable in laying out production charts for the control of beater room operations. The closer the beater roll to the bed plate, or the Jordan plug to the filling, the more power is required. It is evident that an ammeter showing the amount of power used furnishes an accurate indicator in the setting of the rolls.

Jordans equipped with the direct individual motor drive are the ideal equipment, as the motor exerts a center pull, it assists in maintaining your bearings, shell and plug in a true line, while a belt by exerting a continuous side pull throws your bearings out of center, consuming much more power, wears your bearings out of center, and wears your shell out of true, necessitating frequent changes in the lining.

Instruction Charts for Beater Room

The beating engine equipment of individual motor with chain drive and power consumption, recording ammeter in conjunction with Jordan engine equipment of individual motor with direct drive and power consumption ammeter, gives you the necessary flexibility for the perfect regulation of your control, allowing you, thereby, to draw up definite instruction charts to direct the beater room on any class of paper. This will give you the maximum quality and efficiency through the systematic control of these important operations where rule of thumb and experience are the only means of control possible with the old line shaft.

How We Moved a River to Build a Mill

By W. H. SCOTT
Chief Engineer, Kalamazoo Paper Co.

[That's just what was done by a paper mill engineer whose vocabulary does not contain the word "Can't." The advantages gained were all out of proportion to the efforts and costs expended.]

Front view, after the river had been moved and the mill completed

IN February, 1916, our company decided to build a coating mill, and as our engineering force was very busy, it was thought best to bring in outside engineers to make plans for the new mill. It was very necessary that the new plant should be located as near the present power plant as possible in order to solve several power problems we had in view which will be explained later.

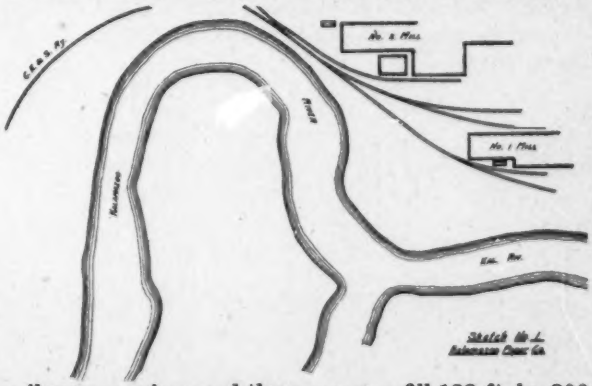
On account of the Kalamazoo river, a stream 108 ft. wide which ran on two sides of the site in question (see sketch 1), the engineers were unable to draw plans that were at all satisfactory, so the writer, whom we will call the engineer throughout the remainder of this article, took the matter in hand and drew the following plans (see sketch 2). This embraced crossing the river for the finishing and calendering departments and building 45 ft. into the main stream to enable us to get suitable length for our coating and raw stock rooms.

The Plan Does Not Get By, at First

When the engineer submitted the plans to the management, they looked at him with a pitying smile, as much as to say: "We are sorry to see your mind failing like this; who ever heard of such a crazy idea of moving a river to build a mill? No, we shall go some place where we won't have to move a river." But the engineer had figured out that we could save about $1,000.00 per month for the coating mill and a corresponding amount for our number 1 mill if we could locate at this point, and after talking the matter over for a few days, the proposition began to look less serious.

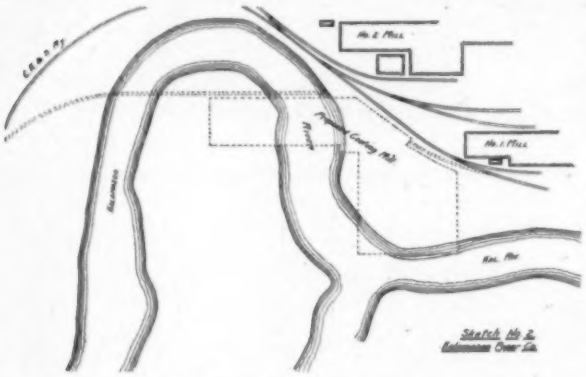
The Plan

In the meantime the engineer had gotten in touch with G. W. Bunker of Grand Rapids, Mich., an old veteran in the excavating line, and explained what he wanted to accomplish. The plan looked very feasible. Mr. Bunker agreed to the necessary excavating for clay storage bin and fill 45 ft. by 236 ft. into the main river; cut a new channel for the river (see sketch 3), and fill across the stream below the building for a



railway crossing, and the necessary fill 128 ft. by 300 ft. for the finishing room, for the sum of $9,000.00. This looked very reasonable, and orders were given to go ahead, which we did.

As we owned the property on our side of the river, it was only necessary to obtain about five acres inside of the Ox-Bow to give us the necessary room for our buildings and the new channel. We commenced by



building our foundations as fast as the dredge made the fills. By doing our own engineering and construction work, we were able to complete the mill ready for use in about seven months.

Some of the Reasons for the Change

The reason we desired the mill placed in its present location was that when we built our number 1 mill we planned to make book paper; this, we figured, would require about 700 h. p., which estimate later proved correct.

We installed a Nordberg cross compound, 22 x 44 x 48 inches, designed for 850 h. p. maximum, but some time after starting we found that we could make a much higher grade of paper with our modern equipment, which we proceeded to do. Immediately our power ran so high that our indicator cards showed from 1,100 to 1,250 h. p., and part of the time long-stroking the engine. This proved so serious that we decided to install two electrically driven Jordans to take off a part of this overload, and purchased the power to drive them. The first contract with the power company proved very satisfactory, but when we came to renew the contract, it proved not to be to our advantage, so we put part of the load back on the steam engine.

Power for the Coating Mill

It was at about this time that the question of the new coating mill came up, so the engineer figured if he could set the new mill close enough, he could put a 1,000 h. p. turbine generator next to the number 1 steam engine room and draw steam from the present boiler plant without increasing the engineering or boiler room forces, which has since proved true. He also figured that the 22 x 44 x 48-inch engine, built normally for 850 h. p., with a specially designed valve for this maximum rating under the present overload conditions, was using about 30 lbs. steam per horsepower. So, by taking off about 400 h. p. under this condition and bringing the engine back to its normal rating, which carried a guarantee of 14 lbs. steam per horsepower, he could save enough steam by putting this excess through the new turbine, rated at 13 lbs. steam per horsepower, to run the new coating mill without cost and still leave the 850 h. p. engine running under a 14- instead of a 30-lb. rating, which proved to be true in both cases.

Steam for Drying

The next thing the engineer wanted was to dry the coated paper economically. We had a 450 h. p. cross compound engine running the super calenders at slightly over one-half load. Careful test demonstrated the friction load of this engine to be 27 h. p. The engineer figured he was getting not to exceed 8% value from the condenser on this engine running under this condition. So he stopped the condenser, disconnected the low-pressure cylinder, thus saving 14 h. p. friction load and losing 8% from the value of the condenser, and adding a back pressure of 3 lbs. to the horsepower cylinder. This furnished us steam to dry the paper and heat the mill at almost no cost, the steam being sent across the yard to the new plant through a 15-inch main pipe located in a duct, also containing electric lines and condensation pipes.

Steam Condenser

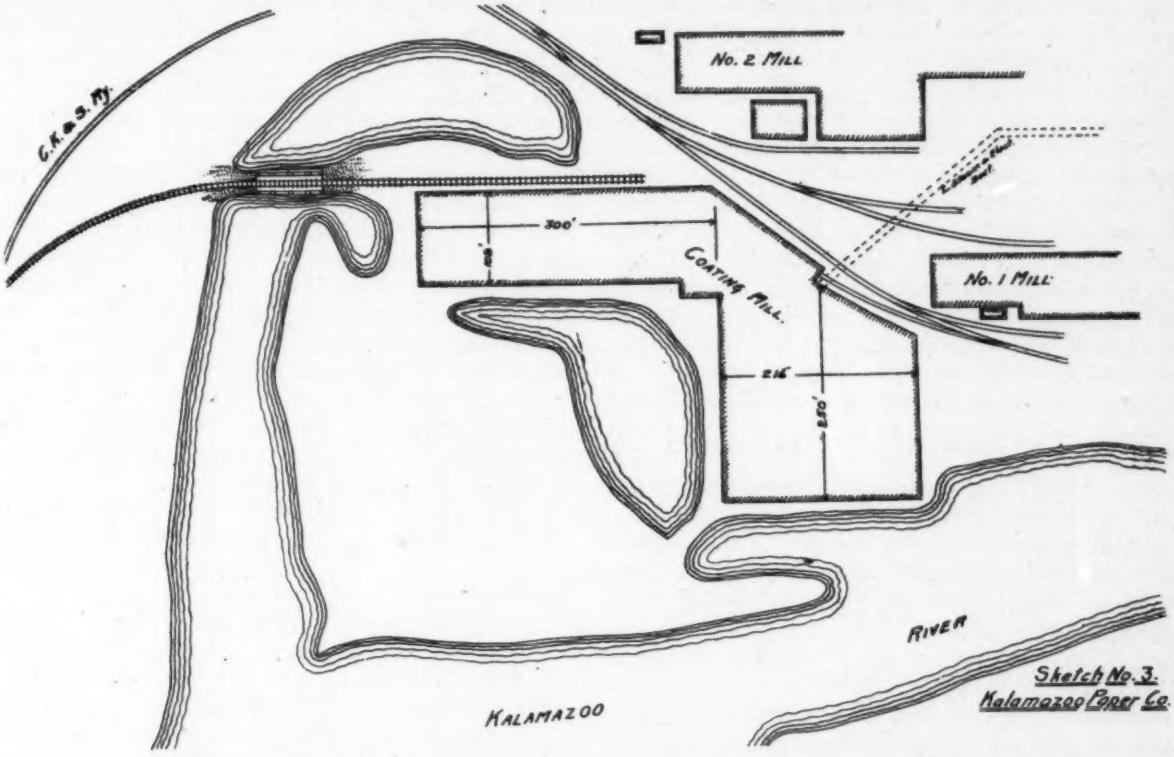
Our next problem was to find water to condense the steam from the turbine engine. During the winter of 1915-16, we had driven six 12-inch wells 100 ft.

Side view of the new mill

deep to supply the water for papermaking. The engineer decided to install two 175 k. w. motors in a pumphouse in the back yard directly connected to two 14-inch centrifugal pumps placed 10 ft. below the surface of the ground, the water in the wells standing at 7 ft. below the surface, thus giving us a head of 3 ft. on the pumps.

Our mill requirements for our three plants called for five million gallons every twenty-four hours. This would give us ample water to condense the steam from our turbine by passing the water through a single-pass condenser so that the same power that was required to pump the water for the mills condensed the steam on the way into the mills without additional power.

The results obtained, fulfilled all our most ardent hopes as, by weaving our problems together, we succeeded in getting power enough to run the coating mill, steam enough to dry the paper, and water to condense the steam from the turbine at no cost to the business, also making a very pronounced saving in the steam required to operate the 22 x 44 x 48-inch engine besides averting the trouble and expense of acquiring elsewhere a site for the new mill.



We also have ample power to run our two electrically driven Jordans that we had previously purchased the power for, this latter making a slight additional draw on our steam plant.

Thus, we figure, it sometimes pays *to move a river to build a mill.*

The Value of Waste Paper Stock in the Manufacture of New Book Papers

By EDWARD T. A. COUGHLIN, B.S., CH. E.

[In arranging the material for this paper I concluded that it would be advisable to state as fully as possible in the introductory pages all the necessary data that I thought had a direct bearing on the subsequent subject matter. In doing so I have gone to great length in stating exactly and from reliable sources of information the different substitutes for wood pulp, and have shown the futility of most of the popular researches, concluding in showing why the use of old papers should be given more thought than has been devoted to this source of paper making material in the past.]

IN approaching this subject it is necessary to set forth the real position that old waste papers have occupied and will occupy in the next few years. For years we have been reading of the rapid disappearance of our forests. We only need to consult statistics to show us astounding figures of the increase in pulpwood production. In 1907 it was estimated that the world's consumption of wood in the paper industry amounted to 29,000,000 cubic meters solid. One cubic meter equals 0.276 cords. One cord is equal to 3.62 cubic meters. For 1913 it was estimated the consumption of wood for chemical pulp alone at 20,000,000 solid meters and 13,000,000 solid meters for mechanical pulp, with a further 5,000,000 solid meters for cards and boards. This shows and clearly demonstrates an increase amounting to 30% in six years.

Reforestation

From this wood in 1913 there was produced over 4,000,000 tons pulp of which about 90% is sulphite, the remainder soda or sulphate. Of this amount the United States produced 1,500,000 tons. Going back to the years 1900 to 1909 the total quantity of pulpwood used increased 100%. During this same period the increase in the consumption of domestic spruce was 35% and the increase in the consumption of imported spruce was 162%. At the present time about one-third of the pulpwood used in the United States is imported and it is estimated that thirty years will see the last of what is now considered pulpwood in this country. What are we to do? Reforestation as carried on in this country will never supply our increasing needs. We have seen how our forests have been devastated year after year with no thought for the future. We have seen the huge mills spring up in Canada almost in the heart of limitless forests. What are we to do to retain the paper industry in the United States and allow its operation to be conducted on a paying basis?

Substitutes for Wood

This question has loomed up many years ago to the American papermaker, and was viewed with more than usual care. It was at once decided that we must hit upon a substitute for wood, to be used in the manufacture of our cheaper grades of paper. Our finer grades of writings need have no worry as to shortage of rags; that supply is fairly constant and readily expands to meet the demand in normal times. Our case at hand refers only to what may be called good book paper of ordinary grade, made chiefly from wood pulps of different manufacture.

For new sources of material to furnish our demands the numerous investigations and reports naturally fell along these groups:

(1) New woods—those which have a quick growth, and which will furnish a lasting supply, by cropping.
(2) Seed hairs—cotton being the only one.
(3) Bast fibres—flax, jute, hemp, ramie, China grass, and sum hemp.
(4) Stems and leaves—straws and grasses such as esparto, corn, sugar cane, bamboo, cotton stalks, wild or cultivated grasses and other like materials.

Wood Research by United States

As to new woods the Forest Products Laboratory of the United States Department of Agriculture has carried out a series of very successful investigations on a substitute for spruce groundwood in newsprint manufacture. All other woods, except those used for tanning materials, have been experimented upon at different mills. In fact, practically all woods may be used for paper making, such use being governed chiefly by the character of the wood supply near the mill. It is a question of supply of the best wood that gives the greatest yield, rather than a selection of a new wood. The demand developed in the past few years, and constantly growing, is not primarily so much for new materials as it is a demand for wood at a price that will enable the poorly situated mills to compete with those more economically located with respect to this supply. This demand can only be met either by a larger use of other woods such as some mills have experimented on, or by planting and growing spruce and poplar. Very good. Mills will eagerly

go ahead and use these other woods which will last them another period of years, but they will not reforest in a scientific or systematic way. It has been demonstrated that they have not, for private interests will not expend this amount of capital for something that they will not directly and immediately get returns from.

Cotton and Textile Wastes

In regard to the use of cotton and textile wastes, these materials have been a recognized source of papermaking material for many years. But the price is the stumbling block, as these materials in their original form command a much higher price for other purposes than they do for papermaking. In fact, all the materials of the second and third groups will make paper of greater strength, durability, and value before going through other manufacturing processes than when used in the form of worn and soiled rags. For example, new cotton fiber, as baled cotton, or that known as "linters," which is removed from the ginned cotton seed as a preliminary step in the cotton-oil industry, is perfectly suited for the manufacture of high-grade paper, but the demand of other industries for this material makes the price prohibitive to its choice as papermaking material. The same conditions exist in regard to the materials noted in the third group, which command from 3 to 20 cents per pound for the manufacture of cloth, bagging ropes, and cordage.

Pecto and Ligno-Celluloses

The materials of the fourth group belong to the class of compound cellulose known as pecto- and ligno-celluloses, and are distinguished from the papermakers' point of view not only by the presence of celluloses, of different chemical composition and lower felting qualities, but also by a larger content of nonfibrous cellulose, which (although it has some desirable qualities, even when present in large amounts, as in bagasse or cornstalks) produces parchment-like effects in the paper manufactured from them. A further technical objection to these materials is that the chemical treatment required to reduce the fiber properly is too severe for the nonfibrous cellulose, which is overcooked and partly dissolved, resulting in low yields of weak paper. Esparto of which only the leaves are used, is an exception to these general statements, and yields a larger percentage of a strong, uniform fiber than the other members of this group. This class of materials, except esparto and bamboo, have, as a rule, short fibers and yield a small quantity of low-quality paper in comparison with the other groups, though some of them are not markedly different from woods in the latter respect.

Taking individually some of the members of this fourth group, it is easily seen that their exact status in the realm of papermaking material is far from being sufficient to warrant their extensive use.

Straws and other grasses contain compound celluloses which exist both in the form of fiber and of nonfibrous cellular material, and yield from 30 to 50 per cent of white paper. These substances are likely to contain much dirt, collected from the ground, which is difficult to remove; if any remains, it increases the cost of treatment and lowers the quality of the paper.

Rice straw might be also mentioned, as some experimental work has been done recently in this country on this material. Examination of the fiber and of pulp made from the straw indicates that the paper made from it is similar in all respects to paper made from the more commonly used cereal straws, and any advantage which this material may possess over the latter is due to local conditions under which it is produced.

With the straws may be properly included the "herds" of hemp, and the broken stems produced in "breaking out" this fiber, as well as bagasse and cornstalks. These latter materials contain more cellulose in the nonfibrous cellular forms than the straws of oats, wheat, rice, etc., and for this reason are not so well adapted to certain purposes.

Bamboo as Papermaking Material

It was demonstrated many years ago that bamboo, which, from the papermaking point of view, may be classed with straw, is well suited for making papers of medium quality like those produced from wood. Later work has confirmed this conclusion, but the material, even in subtropical countries, where it grows luxuriantly and where labor is cheap, is used but little, and it is evident that the cost of standard materials may rise considerably higher before bamboo will play any extensive part in papermaking. The large annual growth of bamboo has called attention to it as a suitable plant to grow especially for papermaking purposes, but while bamboos are successfully grown in this country it seems probable that a more extended use of the native-grown crop will precede its cultivation in this country, particularly as long as a greater profit can be made per acre from other crops. A later report states that unless you had an enormous area of bamboo, hundreds of square miles of it, it was not a source of paper supply that could be depended on for any length of time. In the West Indies, where they tried cutting down bamboo for pulping, it was found that the clumps of bamboo would not bear cutting more than once or twice; the stool then lost its energy to reproduce and they were unable to carry on pulping for any length of time. It is very doubtful, indeed, whether bamboo is likely to be valuable for supplies of pulp (except in Burma, India, where there were enormous areas of it).

And so on, we can compare any source of material that has been exploited as a substitute for wood, and show how impossible it is for it to generally replace wood. It is true that many of the substances men-

tioned may be used for local needs, where quality is not extremely essential, and where the cost is the point in view. But papermaking on an industrial scale is governed by the supply of raw material, the quality of paper it will make, and the total cost of manufacturing it into paper. In valuing a material, therefore, it is as necessary to know how much there is of it and how steadily this supply will be maintained as it is to determine the quality and quantity of fiber it yields, the cost of gathering, transporting, and converting into paper, and whether it can compete economically with other materials used in making the same grade of paper. And after determining all these costs and inquiries and comparing them, it will be concluded that there is no commercial substitute for wood pulp.

Waste Paper Processes

However, we have in our immense supply of waste paper, the only salvation of the future papermaking industry. "The Reclamation of Paper" has been almost as popular a theme as "A Substitute for Wood Pulp." Is such a thing possible? Can old magazines, letters, and billheads, and even newspapers, be worked over so as to produce a grade of paper equal in every respect to the original? For years this has been the goal of many determined chemists and of many enterprising business men, and also of many adventurous fakers. It has been argued pro and con. Many machines have been devised and many processes have been worked out very *secretly* to re-pulp and de-ink discarded paper. Most of them have proved economically to be failures.

In March, 1914, one of our journals prints the following extract from a German publication, evidently the views of its technical editor:

European Views of Waste Paper

"Various processes have been described in these columns for removing printer's ink from paper. All were to effect the same purpose, one being asserted to be better than the other. Unfortunately, they did not prove satisfactory in practice, for the thing is an *impossibility*. The efforts to restore printed paper to its original condition, that is to say, free from printer's ink, is to be classed, according to the writer, with the attempts to produce paper from peat. Both have one defect in common: they are too expensive, as they produce a paper that is not equal in value to its cost.

"The decolorization of waste paper may prove more feasible than the peat process, but not in European or American countries. It is available only for countries in which the wood pulp necessary for papermaking is not produced, or in insufficient quantity, or at prices that are excessive, as in the case of Mexico and Brazil. In these countries, owing to the cost of transportation by sea, wood pulp is very expensive, and a process may find introduction there that would be deemed irrational here. Even, however, admitting the claim, that by removing printer's ink from newspaper, the quality of the product obtained is notable for its having greater strength than cellulose, also that the resulting pulp permits of a higher mineral loading, so that another advantage is gained, the half-stuff thus produced must always remain a by-product. For with greater demand for waste paper the purchase price increases and with the enhancement in cost of the half-stuff obtained from waste paper, cellulose obtains a further advantage.

"The writer maintains that in spite of attentive perusal of trade papers, he has not yet discovered that waste paper, free from wood, could be so unobjectionably decolorized as to be fit for use in making high-class papers."

Successful Use of Waste Paper

Notwithstanding this pessimistic view of the proposition, hundreds of tons of paper are being reclaimed daily and made into number one book paper and similar grades. I have seen even folded news print fed into beaters and worked over again as news print with only a slight preliminary treatment. And these papers not only *can* but DO compete with and undersell a pure fiber paper quite materially.

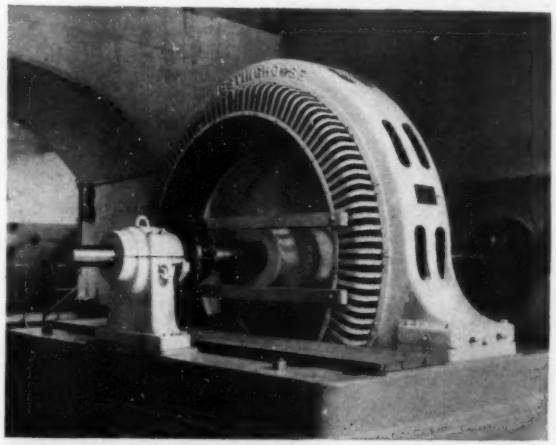
Only a small percentage of paper manufacturers are cognizant of the fact that the treatment of waste paper has advanced beyond the experimental stage and that mills are producing paper in many sections of the country from this material. They do know, however, that these wastes have been used for many years in the manufacture of boards, cover, and cheap blanks.

(*To be continued*)

Advantages Gained by Electrifying a Paper Mill

*By D. H. COLCORD

PULP and paper mills always have with them a serious problem in meeting their power requirements. The power demand varies widely with the product manufactured, but in all cases a large amount of steam is required for drying the paper and for heating the building. As a matter of



1250 Kva. 240 r.p.m. horizontal water wheel Westinghouse driven generator, West Linn Mill, Crown Willamette Paper Co., Portland, Ore.

fact the paper industry has thrived in sections of the country where the raw material is available rather than where fuel for power is cheap. Where water power is accessible, as it is in New England and Michigan, there is a happy meeting of these two factors—power and raw material; but where this is not true, coal becomes the natural fuel.

Efficiency

For the paper manufacturer to keep abreast of the times, an appreciation of his possibilities for power improvement should be fostered. Where and how can he increase the efficiency of his plant by completely changing or supplementing his existing power equipment? Directly answered, by supplementing water power with steam turbines, by installing a complete steam turbine-generator unit for the entire plant, by individual motor drive, and by mechanical stokers.

In using electric drive, the power equipment may be centralized in one plant in large, efficient units of proper type, operating at the most efficient part of their load curve. Requirements for low-pressure steam may be met by installing a noncondensing turbine, from which any amount of low-pressure steam within the units capacity may be bled at constant pressure. The bleeder type turbine automatically cares for fluctuation of both power and the amount of low-pressure steam demanded for heating and drying.

Economy

In an old mill, operating with reciprocating engines which are in good condition, and having an excess of exhaust steam, a low-pressure turbine is the ideal machine to install. The low-pressure turbine will receive the excess exhaust steam from the reciprocating engines and utilize its available energy in producing additional power, the boilers supplying no more steam than before the low-pressure turbine was installed. Another similar condition sometimes exists where some of the beaters, Jordans, etc., are driven by a large efficient engine located in the powerhouse, or adjacent to it, and the remaining machinery is driven by small, inefficient engines and complex shafting. In a case like this, greatly improved economy can be obtained by using a low-pressure turbine in connection with the generator, supplying power to motors driving the machines not taken care of by the large, efficiently operating reciprocating engine.

One side of beater room showing 150-horsepower wound-rotor motors driving beaters in pairs

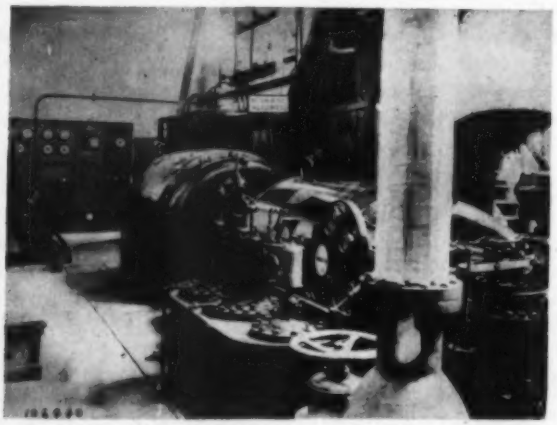
The economy of power generation resulting from the use of large, efficient, turbine-generator units, located in a compact and well-arranged powerhouse, is in itself sufficient reason for the use of electric motor drive in pulp and paper mills. Although econ-

*Westinghouse Electric Mfg. Co.

omies may be effected by electrification at almost any part of a mill, the maximum economy is obtained when electrification is complete, and the economies of power generation and electrical distribution are combined.

The Electrified Paper Mill

A splendid example of an electrified paper mill which supplements water power by the use of steam



2500 Kva. condensing turbine-generator, exciter set, switchboard and two 1500 Kva. transformers. Brown Company, Berlin, N. H.

turbines is the Brown Company of Berlin, N. H., on the Androscoggin river. Aside from their prominence in the pulp and paper industry, they are the largest industrial users of electric power in the New England states. Starting in the lumber business, this company entered the field of pulp and paper manufacture in 1892, and throughout its existence has been noted for its successful financial and progressive operating policies. Early in its history the Berlin Mills Company recognized the advantages to be gained by the use of electric power, and practically all of the mechanical operations are now performed through the medium of motor drive.

To carry on its extensive operations, the Brown Company generates 25,500 horsepower from the Androscoggin river, and augments this by 10,000 horsepower in steam turbine-generators. Most of their generated power is either two or three phase, 60 cycle, at either 2,400 or 10,000 volts, alternating current. They also generate about 5,000 horsepower at 600 volts direct current. These mills present nearly all types of motor applications encountered in pulp and paper mill work. In 1917, this company used practically 15,000,000 kilowatt hours per month, which was about 12% of the entire central station output of the New England states.

Of a total of 1,200 motors installed, aggregating 41,500 horsepower, approximately two-thirds are Westinghouse. To mention only a few of the motor applications, there are fifty-six 75-horsepower 695 r. p. m., type CW wound-rotor motors, driving beaters through chain drive; eight 250-horsepower 390 r. p. m., type CW motors, and three 150-horsepower 383 r. p. m., type CW motors, direct connected to E. D. Jones & Sons Co.'s Jordans.

Application to the Paper Machine

For driving a 165-inch Fourdrinier machine producing approximately 50 tons of Kraft paper per day, the Brown Company has installed complete Westinghouse equipment. The variable-speed end of the paper machine is driven by a 400-horsepower, 550-volt, 86 to 600 r. p. m. adjustable-speed direct-current motor, while the constant-speed end is driven by an alternating-current constant-speed motor taking power from the main power-supply system. Power is furnished to the 400-horsepower motor by a 300-kilowatt, 600-volt direct-current generator having a direct-connected exciter, geared to a non-condensing steam turbine. This outfit is designed to run on 100 lbs. steam pressure and the turbine exhausts under 5 to 10 lbs. back pressure into the dryers of the paper machine. The 7-to-1 speed range on the 400-horsepower motor is obtained by combination motor and generator field control through the medium of a central panel with a motor-operated rheostat. The entire drive is eminently successful.

The Steam Turbine

Aside from the electric drive itself, several advantages are obtained by the use of a steam turbine. The steam is supplied to the dryers free from oil; it is a well-known fact that a thin coating of oil on the

100 kw. synchronous motor-generator supplying power to 100-horsepower, adjustable-speed direct-current motor driving paper machine. The synchronous motor of this set has access capacity available for power-factor correction

inside of the dryers causes a considerable loss in heat transfer from the inside to the outside of the dryer. Moreover, the turbine is located more convenient to the live steam supply, and the motor is located more convenient for the drive of the variable-speed end of the paper machine. Two more paper machine drive equipments are being installed similar to the one described. Each of these outfits will consist of a 300-horsepower, 250-volt, 100 to 700 r. p. m., direct-cur-

rent motor, a 250-kilowatt, 250-volt direct-current generator with direct-connected exciter, gear driven by a noncondensing steam turbine and an automatic, motor-operated control. These will supersede steam-engine drive on paper machines having a production of approximately 50 tons per day.

Electrolytic Bleach

Direct current at 600 volts is used to produce bleach and caustic soda by the electrolytic process. The electrical equipment for this process consists of direct-current generators and synchronous converters. The new substation is designed for 1,000-kilowatt Westinghouse synchronous converters with induction regulators, two of which are already installed.

Welding Apparatus

A 300-ampere portable arc-welding set is used for mending digester shells and repairing various other machines and equipment. Machinery which has been damaged or badly worn and would otherwise be scrapped, can be placed in first-class operating condition by the use of this equipment. The machinery thus restored to usefulness and the saving of time have proved to be important items of economy in the operation of the mill.

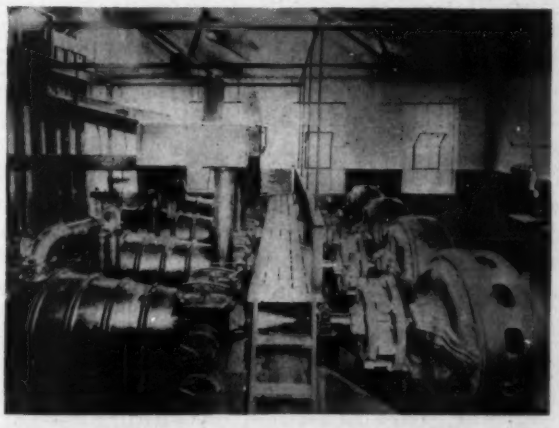
The Electrified Board Mill

A thoroughly modern, electrically-operated paper box-board mill is that of the American Box Board Co., Grand Rapids, Mich. Electric power is generated by two 750-kilovolt-ampere Westinghouse three-phase, 440-volt, 60-cycle alternating-current turbine-generators, one of which is of the straight noncondensing type, while the other is designed for condensing operation with provision for bleeding low-pressure steam for heating and drying. Each of these two generators has a direct-connected exciter, but there is also a 25-kilowatt Westinghouse direct-current geared turbine-driven unit installed for use as an auxiliary exciter and for lighting the mill at night or on Sundays.

Eight 1,500-pound beaters are driven in pairs by four 150-horsepower 435 r. p. m. Westinghouse wound-rotor motors. These motors each have double shaft extension with two pulleys, and they are belted to the beaters through lenix drive. Each motor is controlled from a panel on which is mounted a drum type controller, an oil circuit breaker, and an ammeter for indicating the load carried by the motor. The coil circuit-breaker and drum controller are mechanically interlocked so that it is impossible to start the motor except with all of the resistance in the rotor circuit. The direction of rotation of the beater rolls may be reversed when necessary, by means of a double throw knife switch on the motor control panels.

Jordan Equipment

Four Jordans are direct-connected through flexible couplings to 125-horsepower 385 r. p. m. Westinghouse squirrel-cage motors with which panel-mounted auto-starters are used. Each control equipment includes an ammeter and a double-throw knife switch for operating the motor in either direction. Squirrel-cage motors are used for driving warmers, stock pumps, and agitators. An interesting part of this mill is the Westinghouse equipment for operating the 114-inch trim five-cylinder board machine. Belted to the variable speed end of the board machine is a 100-horsepower 250-volt, direct current motor which has a speed range of from 237 to 950 r. p. m. Power for this motor is supplied by a 100-kilowatt motor-generator, the synchronous motor of which is rated at 300-kilovolt-amperes. This motor was made larger than necessary to merely drive the generator, in order that its fields might



Four 125-horsepower, 385 r.p.m. squirrel-cage induction motors driving Shartle Bros. Jordans

be overexcited to improve the power factor of the alternating-current system. On the shaft of the motor-generator is mounted an exciter which excites the field of the alternating and direct-current ends of the set and also the field of the 100-horsepower adjustable-speed paper-machine motor.

This 100-horsepower motor is controlled by an automatic motor-operated controller which provides for starting and stopping the machine or speeding up or slowing down, from a push-button station located in the machine room, or from a push-button station located on the control panel installed in the basement adjacent to the motor.

A unique feature of this entire installation is that each machine is a unit in itself; that is, it is driven by an individual motor independently controlled, and the amount of power in actual use is indicated by an ammeter on a panel board near the motor.

Water Purification for Paper Mills

By M. F. NEWMAN
Water Purification Engineer

THE water requirement for paper manufacture is so great that the mills necessarily locate where an ample supply is obtained. The most accessible supply being from streams, the mill locations are therefore generally by a riverside. The water in streams at ordinary stages is, in the main, well suited to the manufacture of common grades of paper, but at a high stage of water the mud and other foreign matter carried in suspension becomes a serious handicap.

Pulp as a Filter

The pulp is almost a perfect filter, consequently the use of dirty water results in a deposit within the pulp, which discolors the paper and prevents the production of uniform shades of either white or colored stock. At first thought, the removal of suspended matter seems to be a very simple process, and, in fact, it is a comparatively simple matter to pass water through a filter bed, in which any of a number of substances can be used to clarify the water. The apparent simplicity of filtration lures many into expenditures for simple filtering equipment that is efficient for but a brief period.

Causes of Filtration Failure

The most efficient filter accumulates mud, silt, etc., on and in the filter bed in direct proportion to the amount of suspended matter per gallon and the number of gallons being filtered. Porous filtering mediums are favorites with the uninitiated, because trial filtrations on a small scale show excellent results, but with such mediums in practical operation the pores soon become filled and the adhering mud or silt cannot be effectively washed from the bed.

The removal of suspended matter from water with mechanical filters is often attempted without any provision to first remove by sedimentation the suspended matter that will precipitate within a reasonable time. The result of such practice is to overload the filter beds with mud and to waste a large volume of water in washing.

Many failures of filtering installations can be traced to inefficient preparation of water by coagulation and sedimentation before passing it through the filters. The suspended matter carried by water in different localities is extremely variable in character, and in many streams iron in soluble form is also present. All iron compounds are injurious and must be removed to produce paper of uniform color, as the iron affects all colors and also causes discoloration in the size.

In the clarification of water it is possible to include the removal of all iron, whether in suspension or in solution, and with an efficient filtration system the effluent is iron-free in addition to being free from all substances in suspension.

Preliminary Treatment

The treatment of water for filtration will vary with the kind and amount of impurities in solution and in suspension, but when the preliminary treatment and sedimentation is properly handled the water after filtration is in a condition where all of the processes can be brought to a uniform standard that will eliminate the irregularities that occur when using water directly from the source of supply, which is subject to all of the seasonal variations and the pollution from industrial sewage.

As a rule, the greatest factor in connection with a water supply is the amount of suspended matter or coloring matter in the water, but there are also water supplies containing large quantities of carbonates of calcium and magnesium in solution that cause a great deal of difficulty, due to the formation of precipitates in sizing and in coloring. For many of the special grades of paper, it is therefore very desirable to reduce the temporary or carbonate hardness of the water in addition to removing the iron and suspended matter.

Individual Problems

Each mill has its own specific water problem, dependent upon the character of the water supply and the quality of stock being manufactured, but in practically all cases where fine grades of white and colored stock are manufactured the purification of the water will result in obtaining a more uniform product and will save dyes, size and acids.

Organic Matter

Organic matter in suspension or in solution is an obstacle in the manufacture of paper for wrapping food products, even though it is parchmentized, for certain kinds of organic substances contain mould spores which will develop upon stored paper. Other organic substances nourish mould spores deposited from the atmosphere.

The acid process will not destroy mould spores nor remove the organic substances upon which they grow. The purification of the water and its sterilization is the remedy that must be applied to insure a product that will remain free from mould or odor after the long storage periods between mill and user. Some water supplies are fairly clear at certain seasons, but for part of the year are subject to sudden periods of high turbidity. When the water is thus fouled, production is curtailed or the quality of the output is lowered.

Value of Proper Filtration

For paper manufacturing, the value of filtration in constantly maintaining a supply of clear water, free from iron, is far beyond the actual cost of obtaining it. There can be no standard design of apparatus which will be entirely suitable for the purification of water from every source, because the soluble and insoluble impurities in the water and their variation must be considered in the design and in the treatment prescribed. To effectively accomplish the clarification and organic purification of water with filters, it is necessary to get the impurities to be removed in such form that they can be precipitated in a sedimentation tank or basin or intercepted on the filter bed. Efficient sedimentation after proper coagulation will remove from 50 to 90 per cent of the impurities in the sedimentation tank, thus relieving the filters to that extent, and thereby decreasing the quantity of water wasted in washing the filters.

Coagulation

Various substances that act as coagulates are used, but aluminum sulphate is the one most generally employed. Any water having an alkalinity, i. e., containing soda, lime, or magnesia as carbonate, readily decomposes aluminum sulphate, forming insoluble aluminum hydroxide. The action of the aluminum hydroxide is to enmesh the finely divided suspended particles of mud, silt, bacteria, etc., and these are either precipitated in the sedimentation tank or caught on the filter bed. The accumulation of the insoluble aluminum hydroxide forms a blanket on the filter bed which is of vital importance in obtaining the proper clarification and organic purification of the water.

Alum as the Coagulant

Aluminum sulphate, when properly used, does not harden the water but merely changes the nature of the hardness. In water that is acid, neutral or of very low alkalinity, it is necessary to add a reagent to insure such an amount of alkalinity that sufficient coagulant can be used to effect the purification of the water. When lime is added for this purpose in water of such a character as above, it will harden the water to the extent of the lime added. If, however, a soda compound is used, such as sodium hydroxide or sodium carbonate, the hardness of the water will not be increased.

The Filter Bed

An efficient filter bed rapidly becomes coated with the suspended matter intercepted, so that the cleansing process is of great importance. The selection of a filtering medium requires careful consideration to insure the highest efficiency in filtration and to permit of the removal of the accumulated impurities by washing the material in place, without any loss of material during the washing process. Practical experience alone provides the necessary data to guide in the selection of filter material to insure certainty in performance.

Specific Requirements

It should be apparent that the clarification of water and its purification by removing iron and organic matter is a process requiring specific knowledge of the various characteristics encountered in different water supplies carrying different kinds of suspended and soluble impurities and that there can be no real economy in experimental or makeshift equipment that only partially accomplishes the desired result.

Benefits Derived from Standardized Water

The benefit of a water standardized so that under all weather conditions the water used throughout the plant would be of the same uniform quality, clear and free from iron, should appeal to the paper manufacturer who is interested in maintaining uniformity in his product.

The need of more exact methods in paper manufacture is quite apparent, and the manufacturer who improves his methods to eliminate the variations that are caused by impurities in the water supply will standardize his product and enhance its value. The larger number of users of steam boilers at paper mills fail to recognize that in neglecting to remove from the feed water those impurities known to produce scale and corrosion, they are constantly suffering a serious loss on account of fuel waste, repairs, boiler cleanings, tube renewals, and loss of boiler efficiency. Scale only one-sixteenth of an inch thick will cause a waste of approximately 10 per cent of the fuel burned, and as the thickness of the scale increases, the waste of fuel also increases. The annual waste of fuel occurring in boiler plants because of the use of hard water, is a stupendous total.

Fuel Economy

The bad effects of impurities in the feed water can be overcome by softening and purifying the water to remove the soluble hardening substances together with the suspended impurities. That clean boilers will produce steam more economically than when they are insulated with scale, needs only to be stated to have its truth recognized.

Safety in Boiler Plant

The only safe rule for the operation of a steam boiler plant is to completely soften and filter the feed water so that all permanent hardness is removed and the carbonate hardness reduced to a minimum. The purified water will then contain less than a total of 2 grains per gallon of silica and the compounds of lime and magnesia, with the water slightly alkaline and perfectly free from suspended matter. With the feed water thus purified, neither sludge nor scale accumulates, even during long periods of concentration, and there are no substances in the water that will react under the influence of heat and concentration to cause corrosion.

Scale Formation

The effect of the evaporation of the water into steam is to constantly increase the amount of impurities in the water in the boiler. All of the dissolved solids entering the boiler in the feed water are retained in the residual water in the boiler. From these circumstances, it follows that any variation in the amount of silica, lime and magnesia directly affects the total of impurities in the water from which steam is being evaporated. Therefore, extreme accuracy is required in purifying boiler feed water to standardize it, so that with the concentration taking place there will not be an over-accumulation of precipitates resulting in sludge or scale.

Scale will not form with indefinite concentration, for the small amount of silica, lime and magnesia left in the water are of such character that, when precipitated as a result of concentration in the boiler, only a slight sludge is formed. This sludge can be kept at a minimum by proper blowing down and periodic changes of water in the boilers.

Scale and Sludge Prevention

The rational method of purifying boiler feed water is to remove the scale-forming and corroding substances from the water before it enters the heaters, feed lines and boilers. The cost of softening and purifying the water is insignificant when compared with the cost of boiler maintenance under conditions of mud and scale accumulation or the effects of corrosion. Clean boilers fed with clear, soft water will not foam, but soft boiler feed water containing suspended matter is more likely to foam than one fed with water containing impurities that form scale. It is just as important from the standpoint of efficiency in boiler operation, that softened water be entirely freed from all precipitates as it is to properly treat with reagents. A water may be softened to the minimum and still carry such a quantity of precipitates as to cause foaming and priming.

Modern boiler practice is to operate at from 150 to 200 per cent of the builders' rating, using large units with relatively small water content. The higher rate of evaporation increases the concentration of the impurities in the water in the boiler, consequently with unsoftened water, scale is formed with greater rapidity, and the corrosive substances liberated by heat and concentration are more in evidence. Under such high rates of evaporation the softening and purification of the feed water, for softness and freedom from precipitates becomes a matter of extreme accuracy and absolute uniformity, in order to control the accumulation of the insoluble precipitates resulting from heat, pressure and concentration.

Conservation of Warm Water

In many power plants, the warm water runs to waste on account of the oil or other impurities that it contains. The conservation of the heat in condenser waste water results in a fuel saving of approximately 1 per cent for every 11° F. that the water is raised above the inlet temperature. In general, the temperature difference between condenser inlet and outlet is about 30° F., so that a material fuel saving would be obtained by using the warm water instead of feeding cold water to the heater. The removal of oil and grease, including the emulsified oil, can be accomplished concomitantly with the removal of hardness and suspended matter.

Prevention of Corrosion

It is possible with a properly designed and operated water softening and purifying system to entirely prevent the formation of deposits in heaters, pumps and pipe lines, or other auxiliaries, and to prevent the formation of scale within the boiler. Corrosion cannot occur with a properly softened water because the water contains neither corrosive acids nor substances which, in the boiler, could produce such acids.

Large Returns on Investment

From a monetary standpoint, the returns on the investment in efficient water softening equipment will roughly approximate from 25 to 75 per cent of the cost of the installation each year. With such a return on money invested, in addition to the greater safety to employes, the consideration of water purification in connection with the boiler plant at a paper mill is well worth while.

The Duties of a Machine Tender

By PAUL SMITH

IT IS understood that in the development of paper from the raw materials, the machine tender plays a very important part, controlling as he does the formation of the sheet. A description of his responsibilities and duties will necessarily be of interest to all engaged in the manufacture of paper.

In the matter of responsibility the machine tender should be held absolutely accountable for the merits and shortcomings of the machine personnel, the quality of the paper and the production tonnage for his tour of duty. Anything short of full responsibility is erroneous, as the remainder of the machine crew, being under his guidance and instruction, their deficiencies only prove that his duties have not been properly performed, the most important of which is the training of an efficient crew.

The Machine Hands

The duties of a machine tender, while seemingly numerous and varied, are very simple if he has or can acquire the knack of teaching his crew the duties expected of them, training them in these duties so that they may do their own work at the right time in the proper manner, without any bustle and flurry. This will relieve him from the actual manual operations, except in case of emergency, allowing him to concentrate his mind and energies on the inspection of the machine parts and his personnel, looking to their improvement wherever possible.

Aside from the directing of his crew, the inspection of his machine parts is the only requisite necessary for his success as a first-class machine tender, and should be as follows:

Screens

Inspecting the condition and the adjustment of the screens, so they may screen the stock clean, and allow the necessary amount of water in the stock to form a uniformly closed sheet; the leveling of the slices to get uniformity in weight across the whole machine width; adjusting the wire shake so as to help produce the desired tearing strength and assist in closing the sheet.

The Wire and Wire Guide

He should always see to it that the dandy roll is kept clean and that it is set on the sheet level, and at a pressure that will assist in acquiring the desired formation; that the suction boxes have the suction required to remove enough water from the sheet without deleterious effect on his wires.

It is very essential that the wire guide is set so as to prevent any tendency it may have to run off, as many a wire has been ruined through the improper manipulation of the guide; the couch roll should have enough weight on it to assure an evenly couched sheet and the guard board set down far enough to prevent the water following around the top roll.

Wet Felts

The wet felts should be washed often enough to insure against markings from a dirty felt, which would mar an otherwise perfect sheet. Set the presses down with enough leverage to press out the water so as to assist in the drying of the sheet evenly across the machine width, and adjust the smoothing press with enough leverage to remove as much as possible the wire and felt marks in the sheet.

Drier Felts

Always keep well-informed as to the condition of his drier felts, having them replaced whenever it is deemed necessary; the replacement of a felt should always be under his direct personal supervision, as it is of great importance that the seam in the drier felt be correctly sewed; in case the seam is not sewed properly (as, for instance, when the thread is pulled too tight) it will make a pucker in the seam, causing the felt to wrinkle and perhaps ruin the felt, or at least cause the extra loss of time with attending inconveniences to make a new seam.

Calenders, Winders, Etc.

In order to deliver the required grade of paper with uniformity of finish and desired reel perfection, it becomes necessary for the machine tender to inspect the operations subsequent to the sheet entering the calender stack with as much, if not more, care than he exercised previous to its leaving the driers, seeing to it personally that the amount of leverage required to give the desired finish is always on the stack; that the back tender calenders a good even reel, and keep the doctors clean; that the winderman makes a perfect splice and tears out all slime holes and calender cuts, splicing the sheet with a neat perfect splice in each case.

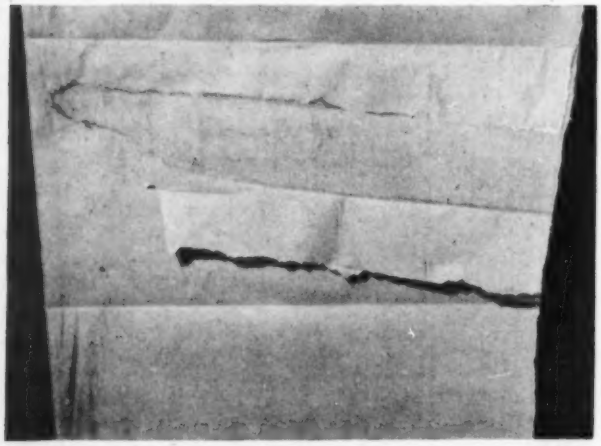
The Finished Product

Inspect the finished rolls from the winder to assure the winding of good even rolls, and oversee the weighing of all his products so that he will always know exactly the machine's production during his tour of duty.

Difficulties Encountered with Printing Papers

By PETER J. MASSEY

THE march of progress in the printing processes has been, as in all other lines, toward greater production, without sacrifice in quality. The flatbed type of press, having attained its highest development and reached the high peak in its production curve, it became necessary that some other principle be adopted and developed to increase production of such grades of printing as the monthly magazines and other periodicals that had attained a large circulation; this led to the adoption of the rotary or newspaper principle with some modifications.



This poorly made splice caused the web to break, the loose end wrapped around printing cylinder and inking rollers, resulting in a loss of 1½ hours of the press "running" time to replace damaged make-ready, and "wash up" the inking rollers

The steadily increasing efficiency of this principle in its application to this class of work led to its almost universal adoption by the printing trade, so that it is now an important factor to be reckoned with in paper manufacture, as the demand for delivery in rolls has grown so steadily that it has outstripped the demand for flat stock in almost every grade of paper.

The difficulties encountered by the printer with roll paper is a subject that should be of interest not only to the manufacturer, but also to the sales force, as it is by some seemingly trivial defects that a paper loses its reputation, necessitating greater effort on the part of the sales force to find markets for the product.

We will try to treat these subjects individually, illustrating them when possible, so as to put before you vividly the actual occurrence in the pressroom, the damage done and amount of time lost, through some carelessness or oversight in the process of manufacture.

Our first subject, splices, is one of the most important of those defects, being an ever recurring source of trouble to all consumers of roll paper, and may be overcome only through the realization of its importance; greater care will then be exercised in the making of a splice.

It would be quite a mistake, of course, to jump at the conclusion that the mills manufacturing printing papers in rolls did not know the importance of the splice, as there are some mills which have made quite an exhaustive study of this matter, with the result that their product is only an occasional offender, being well within the percentage allowable to the human element, but the fact still remains that in the majority of roll papers the perfect splice is very conspicuous by its absence.

Perhaps you are one of the forward looking superintendents or managers who have already gone into this matter, and have profited by past experience. Even so, it is still possible to derive some benefits from this article by having it circulated where it will assist you in impressing the fact of its importance on your organization so that they may try to reach perfection.

Improvements in the smaller details of manufacture, like this, for instance, are responsible for gains all out of proportion to the time and effort expended. The gain in reputation and good will for your product that can be achieved in this manner is priceless, as the consumer, which in this case is the printer, will demand the paper that gives him the least trouble and greatest production.

An imperfect splice, while traveling over the leading rollers, parted and doubled over a number of times. This resulted in a loss of six hours production time, replacing the make-ready, and waiting for a new electro

It is of no advantage to him that your sheet is well made and is a good printing paper, if through poor splices his production is cut down and his plates battered; he wants production. The paper giving him that, other factors being equal, will be his choice.

The quality of your product, then, is judged, to a large extent, by the accuracy and perfection of your splices, and as there are only two kinds of splices, the good and the bad, there being no half-way mark, yours must be good. The methods employed in making a splice are numerous, but only one can be right, the motions and technic of the right method when once acquired and the importance of the operation realized by the men doing the work, there will be no further anxiety on this score, as the amount of supervision necessary to control the splicing will then be minimized.

The bad splice, as a rule, is the result of the following causes:

The printing plate as it appeared before the batter

1. Trimming the tail of the sheet too close to the splice, this causes the tape to squeeze out over the trimmed edge, when the weight of the roll rests on the splice, during the winding. The sheet should be trimmed about one-half inch from the edge of the tape, the lap should never be less than one-quarter inch from the edge, as the strain occasioned by the reel tension, while the splice is making its first revolution on the winder, causes the tape to give, sometimes a full quarter inch, as it is still warm and soft, not having had time to become fully set.

2. Laying the tape too close to the edge of the splice, for the same reasons as in No. 1. The tape should be laid on the loose end of the roll not closer to the end than one-half inch.

3. Allowing the tape to come over the side of the roll. This causes it to hold two or more thicknesses of the paper together, so that when the roll is being unwound it causes the web to break at that point.

4. The sealing iron not being hot enough to make the tape form a perfect union. This allows the splice to separate while being run on the press.

5. By skipping over some spots while drawing the iron across the splice, causes the web to break at these spots while running on the press.

6. When the loose ends are not held true while making the splice, the paper wrinkles, these wrinkles are crushed by the winder rolls, weakening the sheet, somewhat like a calender cut, this causes very serious accidents, as the sheet may hold together until it is in the printing cylinders, then breaking and winding around the cylinders or on the form rollers.

7. The want of proper training. The crew should be taught the exact duties they are to perform and the motions necessary to perform these duties with the least amount of effort.

The removal of the defects in your methods, enumerated above will enable your organization to overcome to a great extent the chief cause of complaint

(*Continued on Page 41*)

The damage to the plate caused by the "bad" splice

The Analysis of Satin White

By HARRY C. BRADFORD
Chemist, King Paper Co.

SATIN WHITE, or, as it is sometimes called, Satinite, is a mineral substance used extensively in coated or enamel papers, owing to the beautiful white and compact surface it yields. It is closely related to plaster of paris and chalk, as it is made from the principal raw material used in their preparation, which is calcium sulphate or gypsum.

Satin White is not one of the natural minerals, but a mixture of calcium and aluminum oxide, prepared artificially by grinding together the necessary proportions of slaked lime and alum with sufficient water. Both ingredients must be as free from iron as possible, as iron destroys the purity of tone, giving the Satin White a yellow tinge which necessitates the addition of dyes to overcome. It is therefore considered an impurity and is one of the principal tests in the analysis of Satin White.

It is usually sold in the form of a paste, containing about 70 per cent water and 30 per cent mineral matter. To prepare it for the coating machines, it is mixed in a large tank, which contains an agitator, with more water until the proportions are about 80 to 90 per cent water and 20 to 10 per cent mineral matter. The clay, casein or glue is then added; the agitation is continued until it is mixed perfectly.

The quality depends upon how fine and even the particles are, the brightness and purity of its white color, the amount of water present (as it is bought by weight, you should not pay for excess water) and the presence of free lime, which gives an alkaline reaction pointing to faulty manufacture.

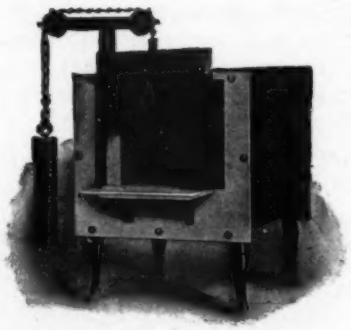
The analysis consists in testing for amount of moisture, the presence of free lime, acid, iron, calcium oxide (CaO) and aluminium oxide (Al_2O_3).

Sampling

The analyses will serve no good purpose unless the average sample is taken. It is often more difficult to obtain a true representative sample than it is to make the analysis. A convenient method to adopt is the following:

Take a sample from several barrels, weigh the barrels before taking the sample and compare them with the incoming weights, as it may have dried out to a certain extent from standing. Take your samples from different places in the barrel, including the middle and ends, making it a real representative sample. It is then thoroughly mixed, breaking up any lumps that may be present. This will give you a good average sample to work with.

About 200 grams are weighed out on to a large watch glass and spread over it in a thin layer, it is then dried in an electric oven at not above 100° C. The watch glass and contents are weighed every half hour until it has reached a constant weight, it should then be allowed to cool in a desiccator to prevent the



absorption of moisture from the atmosphere. The weighing should be done as soon as possible after the glass and contents are cold. The loss in weight on drying is the amount of moisture. It should be calculated to a percentage basis on the original weight of the Satin White.

Free Lime

Take about 100 grams, adding enough water to make a paste, and test with litmus paper. It should be neutral or only slightly alkaline, as a strong alkaline reaction points to the presence of free lime and proves faulty manufacture.

Acid

The mixture used in the free lime test, if it did not show alkaline, should be shaken and then allowed to stand, then test the liquid with blue litmus paper for acid, or filter off some of the liquid into a test tube, add a few drops of ammonia, heat the tube until the contents are boiled. If a white flocculent precipitate develops, free soluble aluminium is present, which also proves faulty manufacture, as it shows the presence of free aluminium sulphate.

Iron

There are three methods of iron determination, any one of which may be adopted, your choice being restricted by the material you may have on hand; they are, in the order of their simplicity in manipulation, as follows:

(1) Take one gram of the original sample from the moisture determination, dissolve in about 5 c c of concentrated hydrochloric acid, add 150 c c of distilled water, roll some granulated zinc in a piece

of platinum wire gauze, and suspend this roll into the liquid from the end of a platinum wire until the generation of nascent hydrogen has ceased. The iron will then be reduced to the ferrous state, then titrate back with N/10 potassium permanganate solution. From this you may calculate the amount of iron present by multiplying the factor .005584 by the number of c c potassium permanganate solution used.

(2) Take one gram of the original sample from the moisture determination, dissolve in about 5 c c of concentrated sulphuric acid, add 150 c c of distilled water, then pour this solution through a long glass tube filled with amalgamated zinc (the amalgamated zinc is prepared by shaking granulated zinc with mercury). This will reduce your solution to the ferrous state, when you may titrate as in (1) with N/10 potassium permanganate solution, using .005584 as the factor for your calculation.

(3) The third method is the reduction of the iron by means of hydrogen sulphide and proceeding as in (2). If platinum wire and gauze happens to be on hand, (1) should be given preference. If not, the two alternative methods give good results.

Calcium Oxide (CaO)

Take one gram of dried sample from the moisture determination, and add 95 c c of standard n/2 hydrochloric acid solution, boil, then add 200 c c of water. Be sure the sample has been completely dissolved, then titrate back with n/2 sodium hydroxide solution, using Phenolphthalein as an indicator. The number of c c n/2 hydrochloric acid used less the number of

c c n/2 sodium hydroxide, multiplied by the factor 1.4, equals the percentage calcium oxide in sample.

Aluminium Oxide ($Al_2 O_3$)

Take one gram of dried sample from the moisture determination, and dissolve in 10 c c concentrated hydrochloric acid, add 200 c c of water, boil, then add concentrated ammonia ($N H_4 O H$) until neutral. This will precipitate the aluminium hydroxide. Filter immediately, wash the precipitate with distilled water to remove the sulphates, ignite and weigh, calculating the residue as aluminium oxide.

Difficulties Encountered with Printing Paper

(*Continued from Page 39*)

from the consumers of Roll Paper. Their production will be increased and a considerable saving will be effected on Battered Plates, paper waste and non-productive standing time besides saving a lot of gray hairs and wrecked nervous systems for the Pressmen who use your product.

The accompanying illustrations are photographic reproductions of an actual occurrence in a large pressroom, being a batter caused by an imperfect splice on a 96-page rotary press.

This batter necessitated the making of a new plate, the replacement of the "make-ready" destroyed by the batter, with a loss in productive time for that unit of six hours, which is equal to 30,000 96-page copies, representing a monetary loss of about $60 in standing time alone, without taking into consideration the cost of new electrotype plates and paper wasted.

Of course, all imperfect splices do not cause as much damage as occurred in this instance, but there are many cases where a splice has caused much greater loss, the average time loss caused by an imperfect splice being three hours of the press productive time. You can readily see by this that it would not take very many of these occurrences from one lot of paper to lose the good will of the printer and cause him to term your product "no good."

Troubles and difficulties are what make the industry so interesting, say some papermakers, but surely they can afford to lose a few troubles and still get some interest out of the art, especially the per cent per annum variety, as the majority of the troubles are mere ghosts having no substance or reality when you face them boldly.

Upon investigation you will find that some of these troubles are evils sure enough, but they are not real, because you have made them vanish, while those you have found to be real were not evil, as they have always been overcome when you have met them squarely with the result that your product has increased in quality and production.

An investigation, followed by a little intelligent supervision of this matter, will result in another ghost trouble vanishing, leaving you perhaps with a little less interest in the art of papermaking, but a little more interest per annum.

Woodroom Practice

By O. L. BERGER

FOR the production of the maximum quantity of mechanical or chemical pulp per cord, the principal factor is the economical operation of the wood-room. Especially is this true during the present period of reconstruction, which has brought about the most extraordinary situation in our history. Prices of all raw materials and labor are at the highest levels in the history of papermaking; while prices of the finished product are so low that to have a margin on the credit side of the ledger it is necessary to conduct each operation with the greatest economy and elimination of waste.

To the majority of wood-rooms, the application of economy in operation will result in very appreciable savings, as in no other department do the mills vary more in both waste and operating costs than in the wood-room.

The wood-room operations consist in converting the rough wood, as received at the wood yard, into the raw material for the next operation. Clean wood blocks of proper length in the case of mechanical pulp and clean chips of the proper dimensions for the chemical pulp.

The work of converting the rough wood into chips for the manufacture of chemical pulp can be divided into the following five operations, the first three of which will also cover the production of blocks for mechanical pulp:

The Cutting Up of Blocks

The cutting up into blocks is done either on a slasher saw, for cord wood and small sized logs, or on a suitable cut-off saw for large sized logs. Outside of the mechanical part of the saw operation and the care and maintenance of the saws the main thing to be considered is the size of the cut. The thicker and duller a saw is the more sawdust is made. The most ideal saw is, therefore, the band saw, which for some time has been used in a few mills. Very few people realize that a circular saw cutting 24" blocks makes 1 per cent sawdust if the width of the cut is ¼", or, in other words, for every 100 cords of wood cut up one cord is lost as sawdust.

Where large logs are used it is generally necessary to use a top saw and great care must be used in aligning the two saws so as to cut in identically the same plane. The accompanying sketch shows what poor aligning will do, and it is plain to be seen that a great amount of sawdust and waste can be obtained in this way.

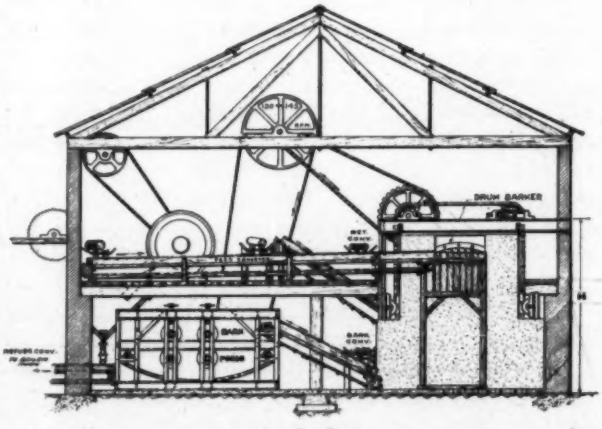
If slasher saws are used it is unnecessary to trim off the ends of the blocks to an exact length, as for ground wood where the blocks must fit the grinder pockets. Some mills do not realize this and a large percentage of the wood is lost in short trimmings which go into the sawdust conveyor. Where a mixture of 4, 8 and 16 ft. wood is cut on a slasher saw at the same time waste of this kind can easily be excessive. This can be avoided, however, if the sawyer pulls the blocks far enough toward him so as to make the other end clear the last saw which otherwise would trim off a short block. It is also very important to keep the saws properly hammered and sharp. This will make a smooth cut with a minimum amount of sawdust or "whiskers" adhering to the ends of the block.

Removing of Bark

After the wood is cut into blocks the bark is removed by a suitable means. This can be done either by the old fashioned knife barker or by the more modern barking drum. During the last three years the majority of the mills in this country have installed barking drums for two main reasons, which are, first, the saving in wood, and second, the saving in labor. The loss of wood by the use of knife barkers runs up as high as 25 per cent, which is 10 per cent bark and 15 per cent wood. The barking drum does not remove anything but the bark so that the loss by the use of this machine will run about 10 per cent.

At the present time there are two different types of knife barkers used. The first is a hand operated machine, and the second a machine furnished with barking attachments. The hand operated knife barker is slower, but more saving of the wood and with pulp wood at $15.00 a cord this saving of wood by careful operation may go quite a way toward pay-

REARRANGEMENT OF WOOD ROOM



ing for the extra labor. The setting of the knives of hand barkers should be done with great care by an experienced man and the knives should be changed or filed at frequent intervals.

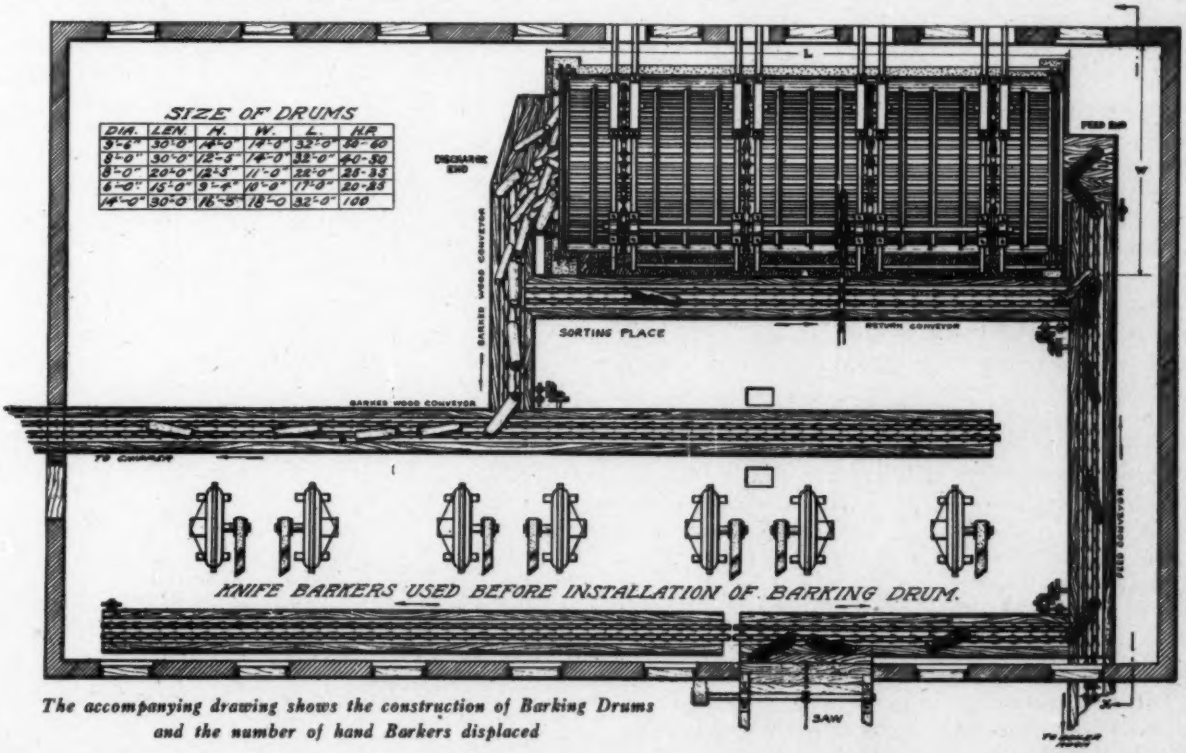
The barking drums are used today for papers of all grades from the cheapest wrapping to the highest grade bond papers. Care and common sense must be used in the operation of these drums and it must not be forgotten that these machines are automatic and will not sort out wood that is not properly cleaned. For this reason all wood from which the bark has not been properly removed should be returned to the drum, and where very high grade papers are made black knots and other defects, which formerly were removed when the knife barkers were employed, must also be removed when the barking drums are used. It must also be remembered that the barking drums are doing very heavy work and that the best of care should be given them to make it possible for them to stand up under heavy service.

Splitting and Cleaning

Some mills are blessed with a good clean grade of wood so that the blocks can go directly from the barkers to the chipper, but the average mill owner works under the misapprehension that anything is good enough for pulp and for this reason a good deal of after cleaning must be done in the wood room. It is a recognized fact that practically all the dirt in the finished pulp outside of what might originate from charred chips in the digester originates in the wood-room. A thoro cleaning of the wood and the removal of all dirt producing parts of the wood will, therefore, insure a clean pulp. Black knots, shake seams, and black ends of the blocks must be removed if a first-class product is to be produced. For the cheaper grades of pulp used in the production of newsprint and lower grade wrapping it is, of course, not necessary to be so careful. In case the blocks are very large it is necessary that they should be split before they enter the chippers. The accompanying illustration shows a horizontal power splitter which is used quite extensively in the Middle West for large sized hemlock. This machine is furnished with a moving table made from chains. It is very effective and can be operated by one man.

Chipping

More attention is necessary in this department than in any other department of the wood-room. Correct setting and sharpening of the knives and bed knife, the right distance of the knives from the bed knife, and the correct bevel of the knives are essential points which must be carefully watched and carried out according to fixed rules. The size and shape of the chipper spout is also important. The best grade of chips with the least amount of sawdust and slivers is obtained when the chipper spout is full of wood, so that no sidewise motion of the blocks is allowed. The very best chip is made when the spout is filled with a single block, and for this reason some mills sort their wood before chipping and have spouts of different sizes to correspond as nearly as possible with the different sized wood. Special attention should be paid to the steady feed of the blocks from the conveyor into the chipper


SIZE OF DRUMS
DIA. LEN. H. W. L. HP
3'-6" 30'-0" 14'-0" 14'-0" 32'-0" 30-60
8'-0" 30'-0" 12'-3" 14'-0" 32'-0" 40-50
8'-0" 20'-0" 12'-3" 11'-0" 22'-0" 25-33
6'-0" 15'-0" 9'-4" 10'-0" 17'-0" 20-25
14'-0" 30'-0 16'-3" 18'-0 32'-0" 100
DISCHARGE END
BARKED WOOD CONVEYOR
SORTING PLACE
RETURN CONVEYOR
BARKED WOOD CONVEYOR
FEED CONVEYOR
SAW
KNIFE BARKERS USED BEFORE INSTALLATION OF BARKING DRUM.

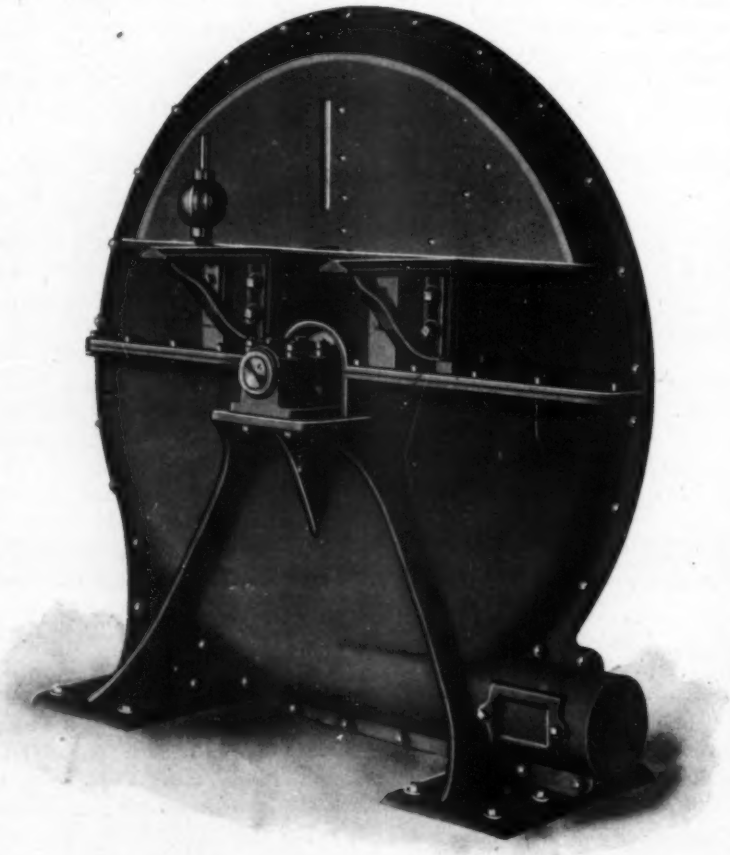
The accompanying drawing shows the construction of Barking Drums and the number of hand Barkers displaced

spout. The block conveyor should be made so that it can be stopped to allow wood to accumulate and insure a steady feed if for some reason the wood does not feed regularly. In other words, the chipper should be run to maximum capacity when it is running, and a single block should never be allowed to bob around in the spout, as this is bound to cause sawdust and slivers.

The correct speed of the chipper has been very much discussed. It is generally agreed that the slower the chipper runs the better chips it will make. For practical reasons it is not found advisable to run slower than 600 cuts per minute, but this can, of course, be increased somewhat if the chipper is fed steadily. Many mills run their chippers as fast as 1200 cuts per minute, but this is entirely too fast.

Screening

The chips should be screened immediately after they come from the chipper and only the coarse, over-sized chips should be run thru the crusher. This necessitates a larger screen capacity, but will pay for itself by a smaller amount of undesirable chips. There are two makes of chip screens, the shaker and the rotary. The shaker screen is probably most commonly used and it is claimed that the slivers will be more easily removed by this type than by the rotary, but that it takes a little more power and up-keep. It is generally found difficult to remove all of the sawdust from the good chips after the slivers have been removed. By the use of an intermediate screen with medium sized openings it is possible to remove the smaller sized chips and the sawdust first and then remove the sawdust from the smaller sized chips. This can be accomplished by the use of a three-deck shaker screen or by any other combination of three screens.



It is, of course, very important that the chips should be of a uniform size, containing as large a proportion of desirable chips as possible. The only way to make sure about this is by a systematic method of testing. This should be done with a set of standard screens and a careful record kept of the results for comparison. After a mill decides upon what size of chips is most desirable for its use it should so regulate its operation that the desirable size will run at least 90 per cent. Sawdust should not go over 2 per cent, and oversized chips not over 5 per cent. The average mill will be, no doubt, very much surprised to learn that its desirable chips probably run 50 per cent and that its sawdust runs from 5 to 10 per cent, and its oversized chips probably as high as 20 per cent. What this means to the finished product can readily be understood.

The matter of drying the chips by artificial means has recently been brought to the front and some recent installations of this kind will be carefully watched as to the results. The only other way to obtain a uniform moisture content of the chips is by the seasoning of the logs in the wood yard, which is a matter not properly attended to in this country. Some mills in Europe season all their wood as long as two years, and if the same results can be obtained by artificial means it is just a matter of cost as to which is more desirable.

In conclusion I wish to say that the average mill owner has in the past not paid enough attention to the correct method of preparing chips. He has carefully watched his acid plants, his digesters, and his wet rooms, but has paid very little attention to that most important part of the whole process, the wood. It is a fact that more money can be wasted in a poorly operated woodroom than in any other department of a mill, and the waste can go on steadily without being noticed.

The Use of Air in the Paper Mill

By M. C. J. BILLINGHAM, Paper Mill Engineer

THE use of air for various purposes in paper mills is by no means entirely new. For many years air has been used to a limited extent for performing certain functions in the process of manufacturing paper, but not until recent years has it become anything like a conspicuous factor. The adoption of its use has been slow, to be sure, in the past, but today its general use is making rapid strides. Hardly a month passes without witnessing some new application of its almost unlimited possibilities.

There are probably many reasons why its use has not been more general in the past but the chief reason, no doubt, was the lack of efficient machines for handling it. But this is a mechanical age and those interested in the development of air handling machinery have not failed to keep pace with their colleagues who were constantly improving machinery in other branches of work. Steel plate fans are steadily being improved for moving large volumes of air at very low pressures. Reciprocating compressors have been brought to a high degree of efficiency by specially constructed valves, etc., but what has probably done more to advance the general use of air in the paper mill than any other one thing has been the advent of the rotary air compressor for handling large volumes of air under medium pressure at a small expenditure of power because it is in this form that air can be used to the greatest advantage in the majority of places in the mill.

Did you ever stop to consider to how many uses you are putting air today in your plant? Let me enumerate a few of them briefly; practically all of them in use in some mills, some of them in use in all mills.

Forced draft under boiler furnaces.
Induced draft in smoke stack.
Pneumatic coal and ash handling systems.
Pneumatic soot blowers.
Cooling systems for electric generators.
Air lifts for pumping water.
Hot air heating systems.
Forced ventilating systems.
Absorption systems to prevent condensation.
Absorption systems for expediting drying.
Absorption systems for drying coated paper.
Cooling systems for calender stacks.
Vacuum for suction boxes and for suction rolls.
Suction on plate screens.
Air hoists for handling paper rolls, etc.
Dust collecting systems in the dusting room.
Blower systems for washing filter beds.
Blowers for removing stock from cylinders.
Vacuum systems for sweeping the mill floors.
Portable compressors for cleaning motors.
Pneumatic tube systems for conveying written orders to the various departments.
Compressed air to assist in washing pulp.
Compressed air for agitating pulp, bleach, etc.
Blower systems for conveying sorted stock.

The above shows twenty-six uses for air which are in actual practice today in paper mills. Some of them are of minor importance, to be sure, while others are of vital importance; nevertheless, it shows wide range of adaptions and possibilities along this line, and the end is not yet. The use of air in the general manufacture of paper and its allied industries is still in its infancy, and the writer ventures to predict that within a short period every paper mill will have its air piping system to convey compressed air to every part of the plant and it will be just as indispensable and just as essential as the steam piping system or the water piping system.

All of the manufacturing organizations in this line maintain a corps of engineers who spend their entire time experimenting with air, and it is claimed that one of them developed an air compressor which will soon be ready for the market which does not contain one moving part. Compressor manufacturers and others are carrying on extensive experiments continually, and the day is not far distant when one air compressor will supplant all the stock pumps and all the agitators in the entire mill, besides performing a score of other duties at the same time.

A large number of mills today are agitating pulp and other materials by means of compressed air with no small degree of success and will soon develop it to a point of perfection. Pulp is now being pumped by air lifts containing no moving parts and although they are still inefficient, a little more consistent effort and study will overcome the present difficulties.

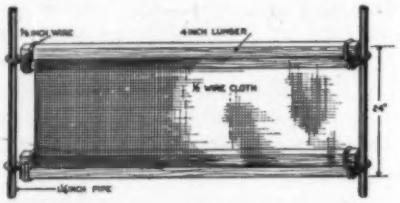
Air is the most plentiful and most flexible medium we have with which to perform work and in some cases has many advantages over steam or water, due to the fact that it can be discharged directly into most materials without discoloring them or changing their temperature, consistency or state. It is harmless when dissipated into a room; there is no damage done in case of leaks or other accidents in the lines. Small pipes usually meet all requirements and no return lines are necessary, making initial installation of low cost.

When you walk through your mill tomorrow just look about and see how many places you could use air to advantage in your manufacturing process—you will probably be much surprised.

PRESENTED FOR YOUR SCREENING

Safety Gate for Winder

The accompanying drawing illustrates a very efficient, yet simple, safety gate for the winder end of the paper machine.



It is easily constructed from material always on hand in any mill, and will eliminate all danger of accidents caused by loose wearing apparel getting caught in the winder.

The materials necessary to its construction are: ordinary 1¼" piping for the stanchions, 2x4" lumber for the cross bars, ¼" wire for the loops, and some wire cloth of any description that may be on hand.

Fire Prevention

Fire prevention in paper mills is of great importance to every mill manager, owing to the distance that the majority of mills are situated from the nearest city fire departments; they must be self-reliant in this important matter, making it imperative that as many fire hazards be removed as possible.

In the vicinity of the mill are locomotives, locomotive cranes, steam shovels and similar equipment used in handling mill materials. There is also a large amount of combustible material in and around a paper mill, the sparks and hot ashes from the handling equipment has often been the cause of fires.

To minimize this danger as much as possible would help toward fire prevention. Spark arrestors should be installed in the stacks of all the locomotive equipment working in the mill yards, by frequent inspection of the ash pans and posting definite instructions as to where the ashes may be dumped without danger of their coming in contact with combustible materials.

Do You Have Safety Inspectors?

It was found by the management in a large pulp and paper mill that familiarity with their equipment led to carelessness in their tour of inspection. To prevent this a system was installed whereby no inspector would cover the department with which he was most familiar, but would inspect all other departments in turn.

While this was an improvement, he did not think the necessary efficiency had been attained, and decided upon further investigation, calling upon the superintendent for assistance. The thought then came to him that if this matter required consultation on his part, it might be better to have the inspection by the safety committee performed as a body instead of as individuals. The superintendent heartily indorsed the plan, and added that he believed the inspection should take place the first thing in the morning, when they were refreshed from their night's sleep and with their minds free from their regular routine work, as the members of the committee were the foremen of departments, master mechanic and superintendent.

This scheme was put in force and has worked splendidly ever since. Their minds are concentrated on the safety work, and a friendly spirit of rivalry has been aroused, each member trying to find some suggestion for the other fellow's department; these suggestions are threshed out on the spot by the committee as a whole, with the result that accidents have now been practically eliminated.

Safety Always

To keep accident risks down to a minimum, it is essential that the campaign be varied enough to hold the interest of the workers continuously.

A method used by a Wisconsin mill makes use of the rivalry in mill departments to keep the interest of the men at a high pitch.

Graphic charts are drawn for each department, showing the percentage of accidents, and placed on the bulletin board in each department, and bi-weekly results are published in the shop paper. C. E.

Machine for Wrapping Counter Rolls

M. J. Power, the inventor and patentee of the machine for wrapping and stenciling counter rolls, has been connected with paper manufacturing for a great many years. The past ten years he has been in a mill that turns out over 200,000 pounds of paper in the form of 9-inch counter rolls. After studying for several years on the problem of wrapping these small rolls by machinery, Mr. Power finally built a small experimental machine which did its work so well that new drawings and patterns were gotten out of a new machine with many improvements, the most important of which was its adjustable feature which allows of rolls from 9 inches to 36 inches in length being handled with only a moment's delay for adjustment. Where by hand work 80 rolls per hour is about the average for two men, this machine will turn out eleven rolls per minute, five men in attendance. Mr. Power is well known among mill men in the west as the inventor and manufacturer of a collapsible shaft for rewinders, and a horizontal splitter for large wood which has met with phenomenal success, and other labor-saving devices.

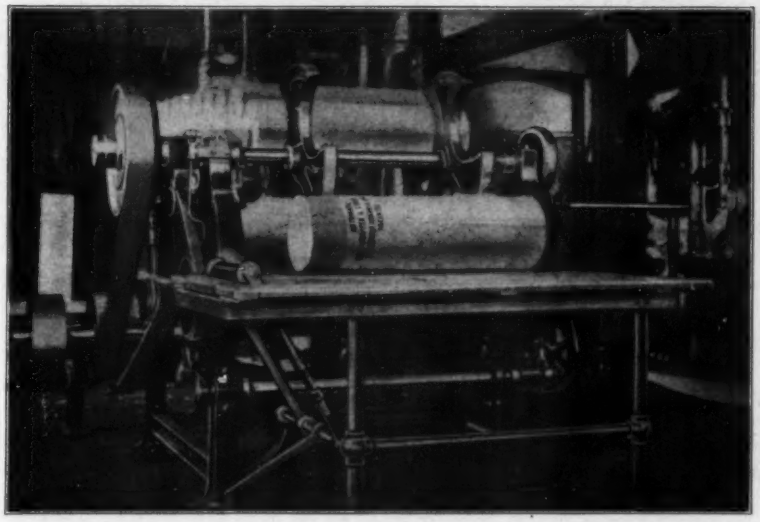
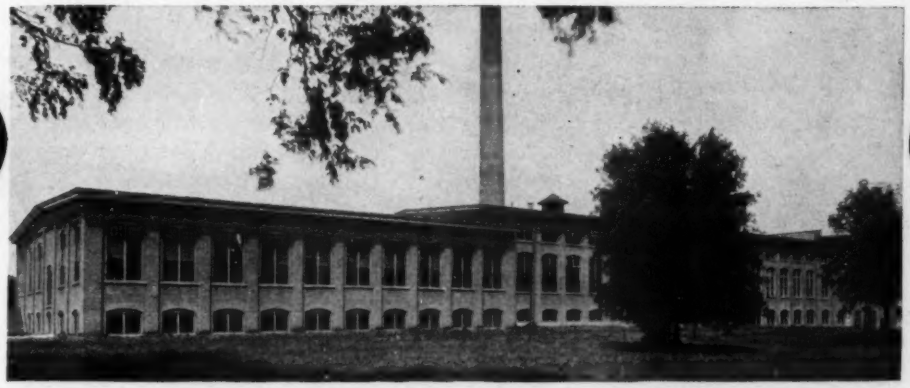


Photo of the roll wrapping machine

This machine is built and distributed solely by the Nekoosa Motor & Machine Company, Nekoosa, Wis., who will furnish all information desired.



The Symbol of Quality

The Symbol of Quality

LAKESIDE PAPER COMPANY

NEENAH, WISCONSIN

"Our name stands for Quality"

We are manufacturers of Bonds, Bible, Book, Catalogue, Eggshell, English Finish Opacity, M. F. and S. & S. C. French, Myriad Manifold, Tiffany Bond, Glazed, Unglazed, and Embossed, Gaza Onionskin, R. R. Writing, Writing Manila, High Cliff Mimeograph, White and Colored Laid Flats. Also other light and heavy weight M. F. and S. & S. C. specialties.

Quality and Service

Quality and Service

THE PRODUCTS OF INDIVIDUALITY

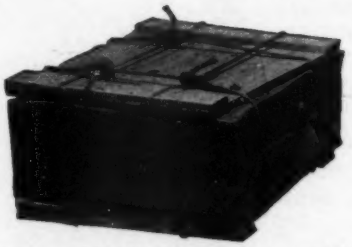
"Wisconsin Wires"
Paper Makers
Wire Cloth *of* All Meshes
WISCONSIN WIRE WORKS
Appleton Wisconsin

Ticonderoga Machine Works
TICONDEROGA, N. Y., U. S. A.
MANUFACTURERS OF
WARREN IMPROVED CALENDER DOCTORS
With Flexible Blades, Universal Adjustment and Control
(PATENTED)
WARREN IMPROVED PATENT DOUBLE DRUM WINDERS
Patent BALL VALVE Hydrant
Stock Circulating Systems *and*
other Paper Mill Specialties
SEND FOR OUR BULLETIN

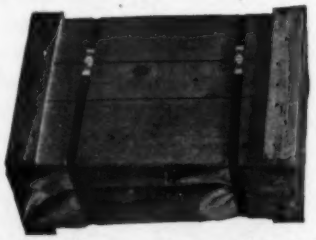
YOU need our
Suction Rolls & Shower Pipes
on your Machines.
Let us make you a Proposition.
Send for Bulletins
The Sandusky Foundry & Machine Co.
Sandusky, Ohio

A Compact Shipping Package

The shipping of paper implies that it shall be delivered in a usable condition; that if the printer orders 17x22 stock, he will get it in such shape that he can use it four letterheads to each sheet. This is obviously impossible unless he protects the corners of his bundle. The illustration shows how a framed ream bundle, tied with rope, has shifted to expose the corners of the sheets to all the hard knocks of freight handling.



In the illustration below is shown a method of binding the same bundle with two steel straps sealed under tension, so that neither frame can shift and expose the corners of the bundle. The Signode System is also less expensive per bundle, at the present prices of labor and rope.



A neat, good looking package that delivers your product in perfect condition to the consumer always makes the first and deepest impression, and is therefore the best of advertising mediums for your product.

The Signode System, Chicago, Ill., will gladly furnish any additional information.

Walks and Roadways

At many mills the roads and approaches are in an awful condition, and the pavements for communication between buildings on the mill property are very conspicuous by their absence.

This is often the direct cause of serious accidents as frequently men walk along the railroad track, not from choice, but because it is almost impossible to get to or from their work in any other way.

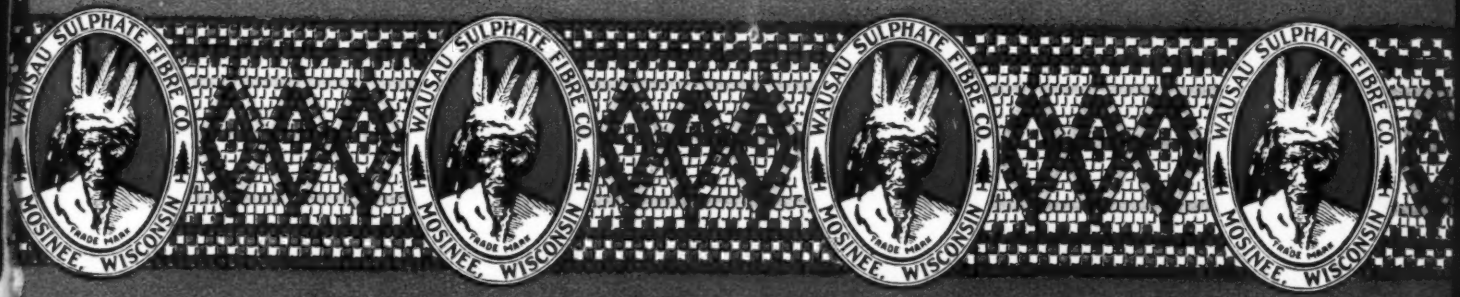
Do You Use Kerosene Oil?

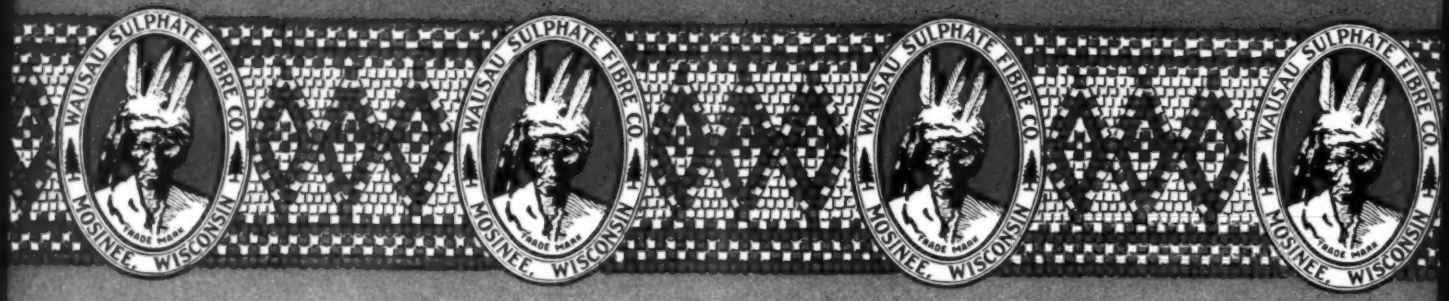
We would like to know the amount used by you, the uses to which it is put, the reasons for its use and what its use has accomplished for you; in fact any information relative to the use of kerosene oil.

The Best is Always Cheapest

Mosinee Kraft

Costs a trifle more per pound but it wraps more packages with less pounds—IT'S GUARANTEED. Every roll and bundle has this Trade Mark on it.

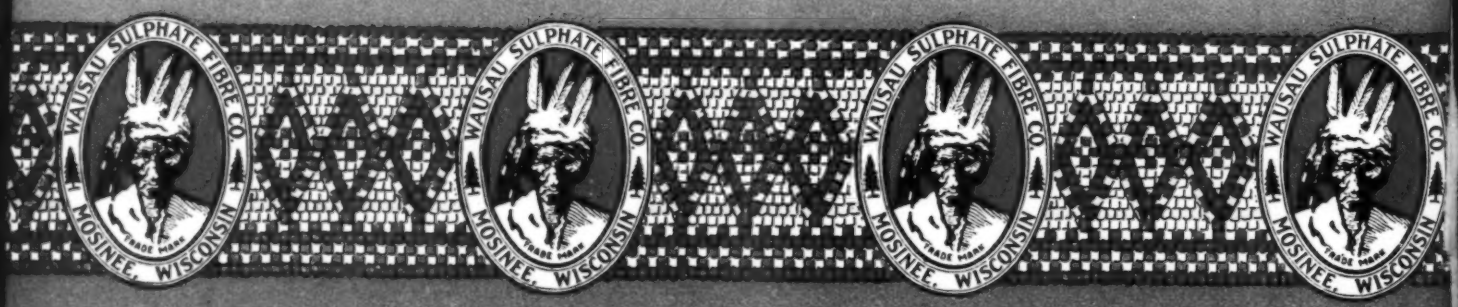




More Merchants Buy It Because It Is Best

Mosinee Kraft

The wrapping paper which gives the service you pay for



FIBRE CO.
NSIN

To insure perfect formation—

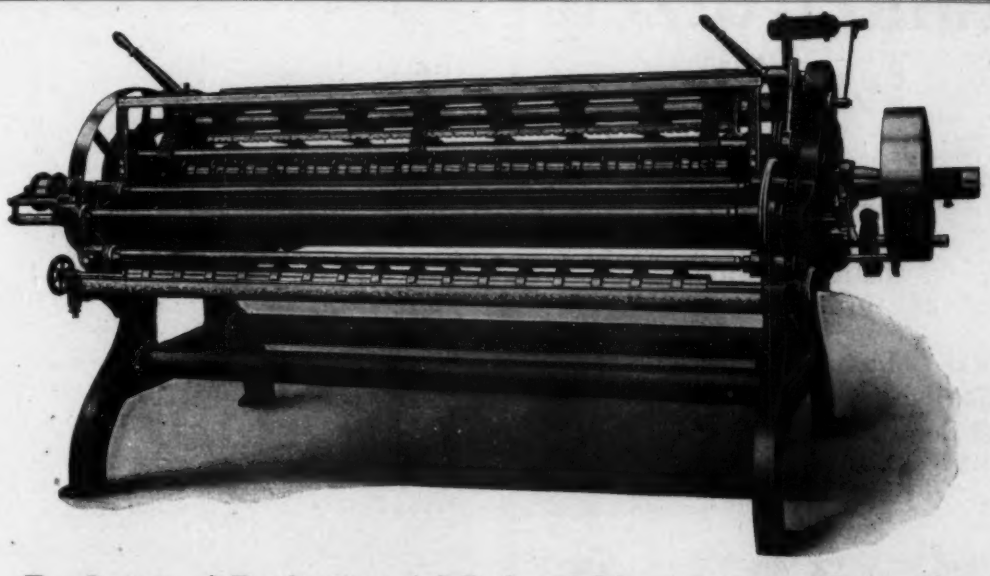
Get the proper amount of SHAKE on the WIRE and maintain the DECKLE FRAME STATIONARY with an

Acme Deckle Frame Support

- **It will prevent thin places in your sheet, due to the vibration of the Slices.**
- **It will prevent lumps from gathering under the Slices and form holes in the sheet.**
- **It will give the Slices a chance to do their work, resulting in a perfectly smooth, even Sheet on the wires.**
- **It will prevent the shaking of the Deckle Frame to pieces.**
- **It will increase the life of the Deckle Strap.**
- **It is indispensable to the making of good Paper.**

Manufactured and Distributed by

HUBAND & NASH, Menasha, Wis.



For Increased Production and Reduced Manufacturing Cost—Use

Hudson-Sharp Rapid Winding Toilet Paper Machines

UP-TO-DATE IN EVERY RESPECT——————*WRITE FOR CATALOG*

Hudson-Sharp Machine Co., Green Bay, Wisconsin

GIBBS-BROWER CO., *Eastern Selling Agents*
261 Broadway, New York, N. Y.

CHAS. A. DEWING, President
A. G. GILMAN, Vice-Pres. and Gen'l Mgr.
JOHN A. PYL, Sec'y and Treas.
JOHN W. POWELL, Sales Manager

1919
THE RECONSTRUCTION YEAR

YOUR LINES can be
strengthened by adopting

Monarch
Standardized
Lines

C1S Litho, Label and Music
Ideal Enamel
Mohawk Enamel
Utility Enamel
Mastercraft Enamel

Standard Machine Finish and Super
English Finish, Offset Music
Ideal and Mastercraft Writing
Mimeograph, Bulking Eggshell
Envelope Papers

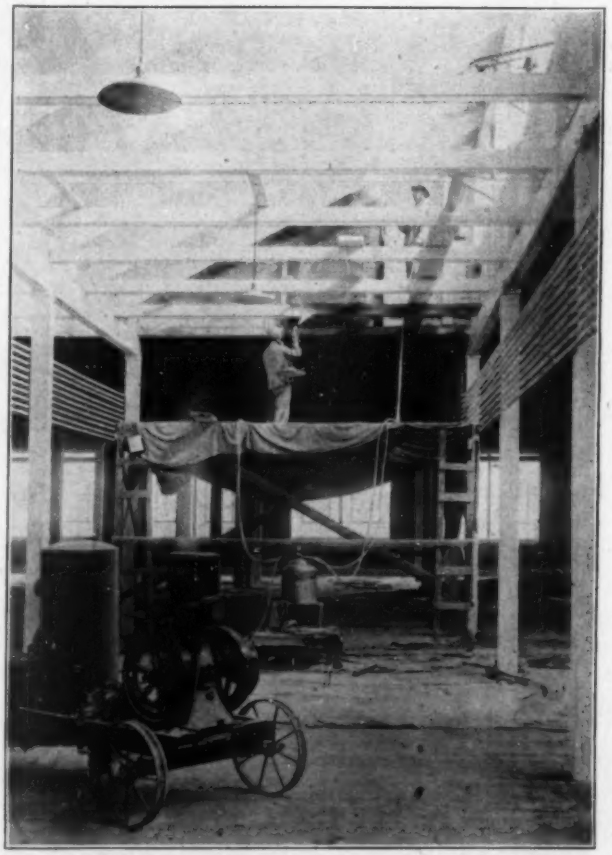
Monarch Paper Co.
Kalamazoo Mich.

3 Paper Machines 15 Coating Machines

Painting by Power

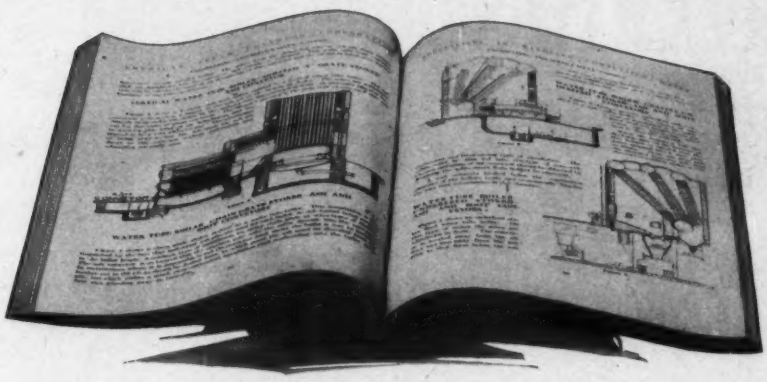
The important features in the use of a portable paint spray equipment are: the cleanliness of the work, the saving in material, the efficacy of one coat, the ease of application to rough surfaces, the uniformity of its work, and the speed in which it covers the surface.

The average workman becomes proficient in a very short time and easily acquires the speed of 2,000 square feet per hour on ordinary walls, as there is no lost time in dipping the brush and no lost paint due to a dripping brush. The machine tanks are of 7- to 14-gallon capacity, so there is no lost time or dripping due to frequently refilling the bucket. One coat in most instances is all that is necessary, as it accomplishes its work without streaks, skimped places, laps or brush marks; it will paint rough surfaces, such as brick, stone or roofing, just as efficiently as the smooth surfaces, saving you all the wear on brushes.



Portable power spray outfit

This compact, portable equipment should be in every mill, as there are no delicate parts to get out of order, its operation is always dependable, and the problem of labor expense to have the necessary amount of painting done will be solved.



How 56 Paper Mills Saved on Ash Handling

A rapidly increasing number of paper and pulp mills are securing low ash handling costs through the use of an American Steam Ash Conveyor.

Our new book, "Modern Methods of Ash Disposal," tells the story of a number of our 56 paper mill installations where ashes are being handled quickly, efficiently and economically.

Here, too, will be found a full description of the methods used in securing these ash handling economies. The American Steam Ash Conveyor is explained and illustrated. Diagrams show how the conveyor can be used in conjunction with various types of stokers and boilers.

If you have excessive ash handling costs, or expensive mechanical conveyors, investigate this unusually successful system of ash handling. Return the coupon below and get this 160 paged book. Sent free to you.

AMERICAN STEAM CONVEYOR CORPORATION

Ash Disposal Engineers

CHICAGO: 326 West Madison Street **NEW YORK: 110 West 40th Street**

Number of boilers.....
Make .....
Horsepower .....
Stokers .....
Average Pressure.....
Present Method of Ash Handling.....
.....

American Steam Conveyor Corporation,
Dept. P.

I have filled out the blanks to the left. Send me your book.

Company .....
Refer to Mr.....
Position .....
City ..... *State* .....

COPYRIGHT 1919, BY AMERICAN STEAM CONVEYOR CORPORATION

Not Only

for Ocean Transportation

But Wherever

Dampness and *Damage* are *a Shipping Menace*

you need

"National Duplex"

The highest development of waterproof case lining.

National Waterproofing Co.

Waterproof Case Lining

1054-56 Drexel Bldg., Philadelphia, Pa.

Hitch for Felt, Stretch Roll

The use of this felt stretch roll hitch assures you that your roll is always running absolutely true whenever you have occasion to stretch the felt, as once the base is set true, horizontally and vertically, there is no danger of having the roll in anything but a straight line.

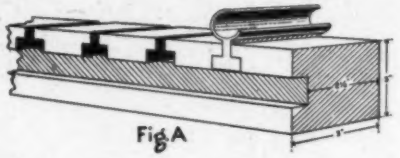
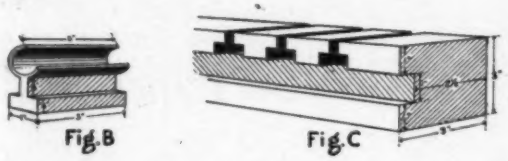


Figure A shows the completed base and socket in position.



Figures B and C give the dimensions and construction of the socket and base respectively.

Lighting the Mill

You should read our lighting articles. Lighting is a problem that is always with us. Not one problem exactly, but quite a multitude of them. We have all had some particular angle of this subject waiting for solution, or perhaps you have solved one angle, only to have had twenty more take its place.

Say! why not take some partners in on it and let them share some of that "trouble." You know Perlmutter says: "That's what a feller gets a partner for —is to let him have the trouble."

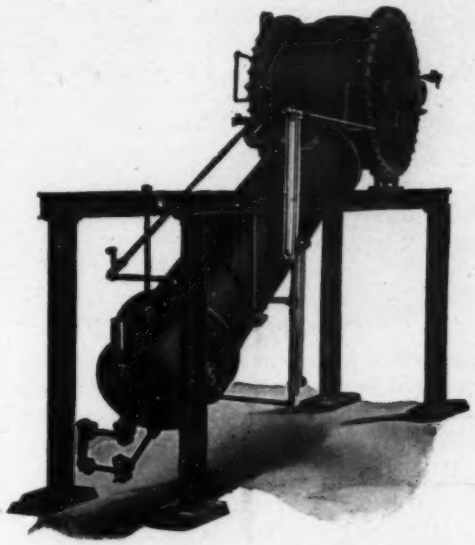
We want to be your partner in this or any other mill problem, so whenever you have a "Hard nut to crack," pass it on to us, and we will pass it over to someone of these experts whose business is that particular "nut" and will hand you back the answer.

What are we going to get out of this?

Why, listen here—read this epic again; look for the joker; there's one in every deck, you know. Do you see it now, right there in the middle of this spasm, it says "Partner," don't it. And a "Partner" cuts in on some of that dividend stuff, don't he? We want in on the "melon cutting," so don't send us all problems and no answers, as all work and no jam on Saturdays makes Jim go fishing. Let's have some of the "white" meat once in a while; leanin' on and appertainin' to how you have squared some of your angles, it may not make very interesting reading to you, but how about the other fellow? He may be up against the same thing right now.

Send us in both your problems and answers indis-

(Continued on page 56)



"Buflovak" Rapid Circulation Evaporation

"BUFLOVAK" EVAPORATORS

and other apparatus for soda, sulphate and sulphite mills.

Leaching Cells, Causticizers, Digesters, etc. Evaporators built to handle all liquors. Horizontal Tube Evaporators, Vertical Tube Evaporators, Rapid Circulation Evaporators, High Concentrators.

"BUFLOVAK" VACUUM DRYERS

for recovering sulphite waste liquor and other products.

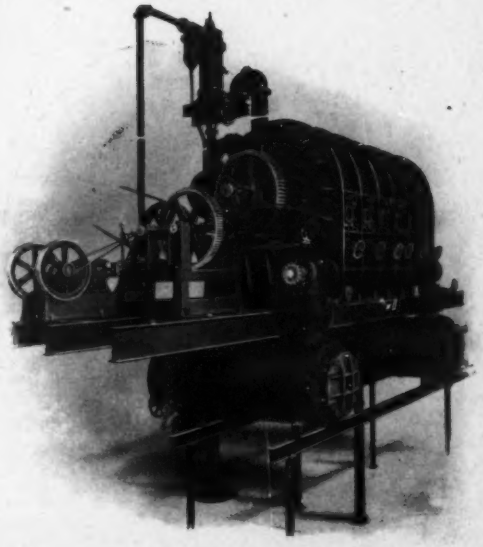
The recovery of sulphite waste liquor from paper mills is one of the important fields developed through the "Buflovak" Vacuum Drum Dryer, which converts the liquor into a dry powdered form at an extremely low cost and yields a handsome profit.

Vacuum Drum Dryers — for drying liquid solutions.

Vacuum Shelf Dryers—for materials that must be handled in pans or trays.

Vacuum Rotary Dryers — for materials that permit agitation or mixing.

Dry Vacuum Pumps, Condensers, Solvent Reclaiming and other Vacuum Apparatus.



"Buflovak" Vacuum Drum Dryer

BUFFALO FOUNDRY & MACHINE CO.

1599 Fillmore Avenue, Buffalo, N.Y.

NEW YORK OFFICE: 17 Battery Place

MAKE THE HANDLING OF

Parchment
Profitable to You

¶We have prepared Samples, put up in neat cartons, for the Jobbing Trade.

¶If you have not received a set we will gladly send one.

ALSO

Special Wholesale Price Lists

FOR YOUR SALESMEN

Sutherland Paper Co.

Makers of
PURE VEGETABLE PARCHMENT

KALAMAZOO MICHIGAN

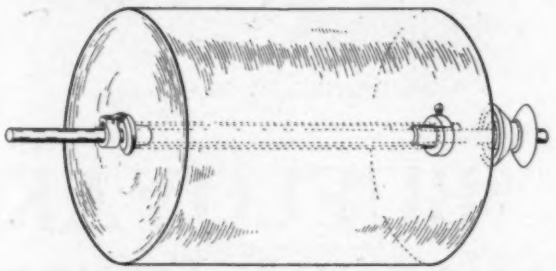
(Continued from page 54)

criminately, and just see how the other fellow jumps to meet you half way. There is no better man on earth for coming across with that half-way stuff than your American paper maker, so come across and meet him on the square, for every time you help him you help yourself.

Don't hold your fist closed and put it behind your back. You can't get anywhere that way. Stick out your hand and receive the true handclap of brotherhood from your fellow American paper makers.

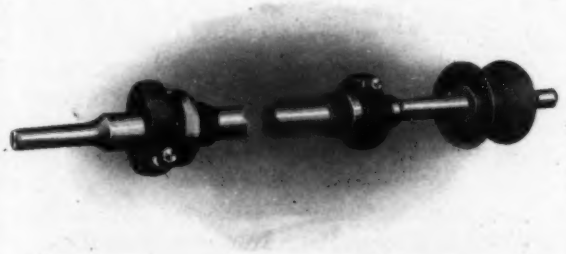
Self-Locking Chuck

These self-locking chucks are made for all kinds of paper roll cores, and for all sizes of paper roll shafts, and can be bored out to be used on a larger diameter shaft than any other chuck.



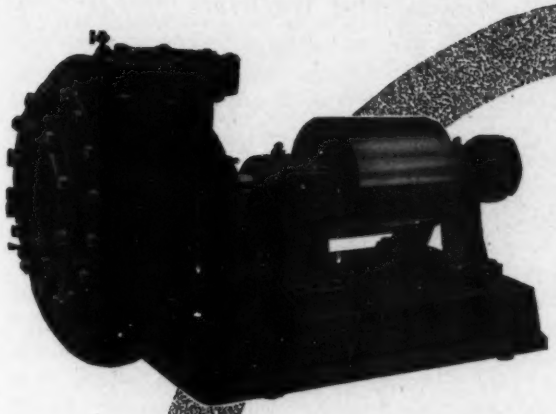
There is a locking collar in connection with both the stationary and self-locking chuck, which is held securely on the shaft by the tightening of one bolt by a standard bolt wrench, without the possibility of bruising or battering either the chuck or the shaft.

They are entirely automatic, as a solid steel pin in the locking collar for the self-locking chuck engages with the cam face of the chuck forcing the chuck into the core while the roll is traveling in either direction, as they are double acting and will work both ways.



They can also be used on a threaded shaft without injuring the thread. The portion of the chuck that enters the core being tapered, it covers a large range of core diameters, and automatically centers the roll on the shaft.

Having no expansion parts, or breakable pieces, they are the most simple and substantial chuck on the market. This chuck is manufactured by the Goss Company, Ashland Avenue, Chicago.



"Buffalo" Paper Pump

Designed and built to eliminate clogging

Buffalo Paper Makers Pumps are designed to meet the requirements of the paper manufacturer—for handling ground wood stock.

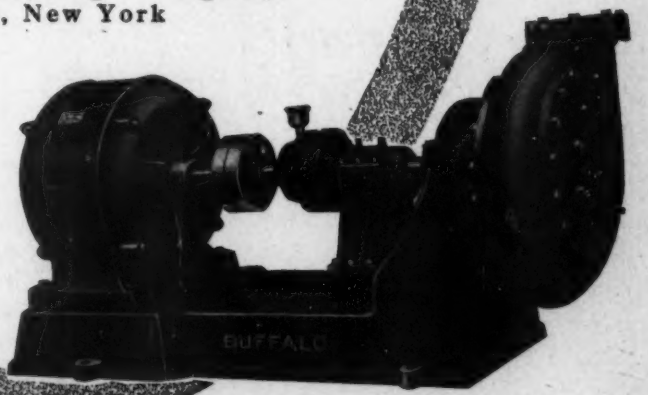
They are in successful use in the largest paper mills in the country for handling ground wood pulp.

Handles wood stock up to 4%

Built for heavy duty continuous service—non-clogging—special designed impeller with extra wide openings.

Write for Circular 248-27

Buffalo Steam Pump Company
Buffalo, New York



The
Michigan
Paper
Company
of
PLAINWELL

MANUFACTURERS OF

Book
French Folio
Non-Fading Poster
Lightweight White and Colored Catalog
Colored Cover
Bible
Writing
Envelope
Tablet and
Mimeograph Papers

PLAINWELL, MICH.

Mill Saved by Fire Siren

Paper mills are, as a rule, situated at some distance from the town or the residence district, so that in case of fire the burden falls upon the shift of men working at that particular time. This has proven a serious handicap in many instances, even where a capable and well-trained mill fire department was on hand, due to the scarcity of help, as by means of the telephone too much time was consumed in calling for assistance.

The homes of executives employed by Nekoosa-Edwards Paper Co. of Nekoosa, Wis., were four miles distant from the mill. This made it a physical impossibility to notify all the executives in time to be of any assistance in case of a fire, when every second is invaluable.

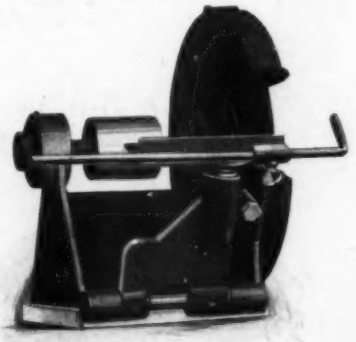
It was decided that the only efficient fire alarm, able to notify the surrounding country instantly in case of fire, was a siren, one of which was then installed in each mill unit.

The chief engineer was awakened at Port Edwards by the unearthly shrieking of the siren at Nekoosa recently at eleven o'clock at night. He immediately jumped into his clothes, cranked up the car, reaching the mill in time to direct the efforts of a numerous and efficient force of fire-fighters, composed of all the men in the surrounding territory.

The fire was quickly subdued, and the paper mill saved from destruction with a small loss.

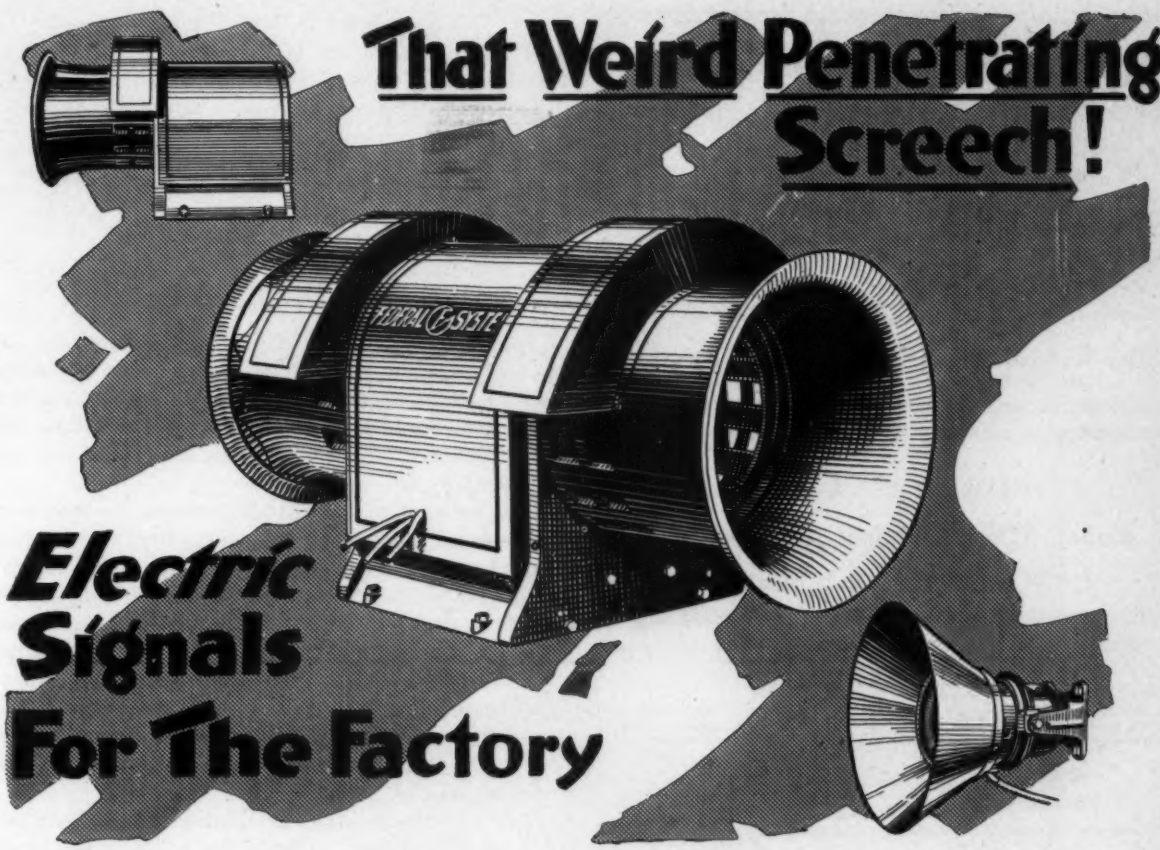
Hardened Steel Cutter

The accompanying illustration is the new Abrasive Metal Cutters that are now coming into use in machine shops and tool rooms, as they are indispensable for cutting high speed and hardened steel. It may also be used for cutting Aluminum, Carbon and many other materials that are too difficult to cut in any other manner.



The old method of nicking high speed or hardened tool steel and then breaking same is very expensive and will allow this machine to pay for itself by the saving in material alone, without considering the time saved, as this material can be cut square or at any angle without burning it, with a loss in metal of

(Continued on page 60)



The FEDERAL ELECTRIC SIREN

It is the practical signal for the factory, indoors or out. Its unmistakable and commanding note is heard, clear and sharp, through the din of the engines and machinery. The shriek of the Federal is never mistaken for any other signal. It reaches for miles around and is instantly recognized. The Federal Electric Siren is genuine protection for your employees and your property.

Several sizes and models for different purposes. It is always ready for instant action at the touch of a push button—buttons can be distributed at several different points in office and factory.

Costs only $2.00 a year for current —no other maintenance expense. Send coupon today for full particulars.

FEDERAL SIGN SYSTEM (ELECTRIC)

Lake and Desplaines Street, Chicago, Ill.

Siren Department

Branches in All Large Cities

Federal Sign System (Electric), Chicago
Lake and Desplaines

Please send full information on Federal Electric Sirens for the factory.

Name .....

Address .....

Company .....

(FI-4)

UNION SCREEN PLATE CO.
Fitchburg, Mass., U. S. A. Lennoxville, P. Q., Canada

UNION BRONZE SCREEN PLATES
(Best phosphorized Cast Metal)
Old Plates RECLOSED and RECUT to accurate gauge
UNION BRONZE SCREWS for Screen Plates
Immediate Delivery of the Largest Orders. Satisfaction Guaranteed
The Witham Screen Plate Fastener, Patented
THE ORIGINAL THE BEST

James L. Carey
Paper Mill Architect and Engineer
208 N. Laramie Ave., Chicago, Ill.

Use WAUSAU QUARTZ
in lining and pointing up your digester. Absolutely not affected by acids. You may choose from twenty different sizes. Will gladly submit samples. Your inquiries will receive prompt attention.
WAUSAU QUARTZ COMPANY
311 Third Street Wausau, Wisconsin

"NORTHERN" means SATISFACTION

ELECTRIC HOISTS *Catalogs Free*
NORTHERN CRANES
NORTHERN ENGINEERING WORKS. DETROIT, MICH.

(Continued from page 58)

only 3/32 inch, which is the width of the cutting wheel, at a speed of 4,000 revolutions per minute.

The machine is equipped with ball bearings, which assures light running, and prevents end play; a swiveled work table which allows the various angles to be readily cut. It is manufactured by Peters Brothers Mfg. Company, Algonquin, Illinois.

New Defibring Machine

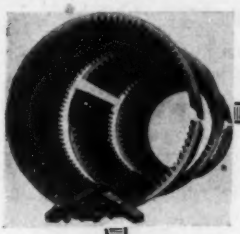
The defibring and washing machine for old papers invented by William Herrbold, in collaboration with Charles Keelan, after having been successfully tested under the most severe conditions, has about reached the manufacturing stage, and will soon be placed on the market.

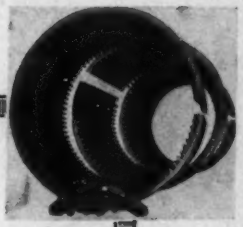
It is so constructed that it receives the raw stock direct from the sorting room into the treating compartment; from there the stock is forced through a quadruple defibring head, after which it flows into the new washer where it is washed under pressure by what is called a squeeze washer, delivering a perfectly washed stock which needs very little bleaching; in fact it can be used without bleaching for the majority of purposes. The fibre is uninjured in any way, being the same length and strength as in the original sheet.

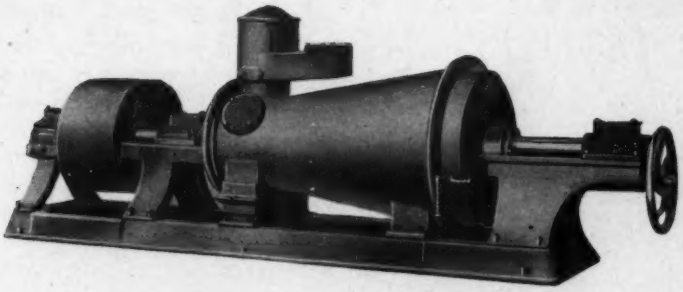
This apparatus may be adapted to the equipment of any mill without interfering with their present layout, as it may be placed on, above or beneath the beater room floor; in fact, wherever convenient space may be found for it, as the device only needs to be attached to some bleach tub units that will have the same capacity.

The outstanding features of this machine are the speed in which the whole operation is accomplished, the small amount of labor necessary for its operation, the enormous saving in power consumed in comparison to the old processes for the same amount of work, and the high quality and color of the fibres produced. The amount of time necessary to treat, defibre and wash 2,500 pounds of stock is two and one-half hours; compare this with your own process. During this time no manual labor is required, one man having full control of the machine. It is of very simple construction, with quick acting valve control and reduces by eight men the amount of labor required for the same amount of work by other methods. In power consumption a 2,500-pound unit requires 90 h. p. and will do more work than the older units having the same capacity and using 240 h. p. As to quality of fibre, there is no comparison, as this process gives you a clean full fibre, which is impossible in using the old method.

The cost of using this machine will be the first cost, as there are no expensive parts requiring replacement every little while as in the case of all the old apparatus now in use.







"The Heart of the Jordan is the Lining"

"Positive"

Trade Mark Registered U. S. A. Pat. Off.

They are used in hundreds of mills on all classes of stock.

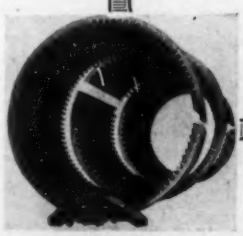
Fine Writings, Glassine, Bond, Book, News, Wrappings, Box Board, etc.

The working edge stands up square and draws out the fibres.

It is not effected by chemicals.

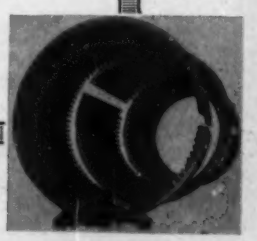
Jordan Shell Fillings

"Positive" Linings are superior to the steel and wood fillings. The cost is less, with much longer life, and it's only a short job to install them. *For your own good, write*



Bahr Brothers Mfg. Co.

Marion **Indiana**



Wheat Paper Company

Manufacturers of

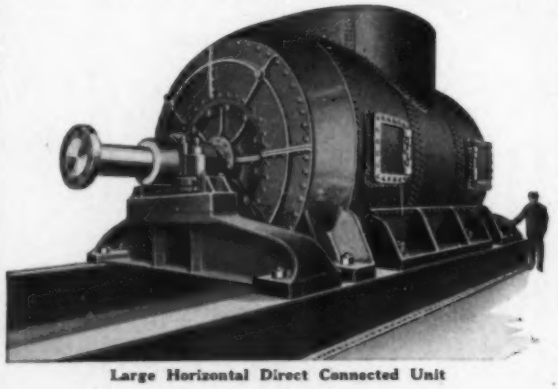
Lithograph, Bond
Writings, Book
and
Colorer Specialty
PAPERS

Elkhart, Indiana

Leffel Turbine Water Wheels

High Speed — High Horsepower — High Efficiency

Vertical and Horizontal Designs



Large Horizontal Direct Connected Unit

Write for Bulletin 54

The JAMES LEFFEL & CO.
SPRINGFIELD, OHIO

SALES ENGINEERS
B. F. Groff, 556 Woolworth Bldg., Lancaster, Pa.
L. B. Dow, Inc., 79 Milk Street, Boston, Mass.
H. H. White, 1503 Fourth Nat'l Bank Bldg., Atlanta, Ga.
William Hamilton Co., Ltd., Peterboro, Ont., Canada.

New Airtight Ash Pit Door

A perfectly tight ash-pit door is essential to prevent combustion in the ash pit, and also in preventing excess air from entering the boiler through some types of stokers. Plant economy and ease in handling ashes are features which should be carefully considered in choosing ash-pit doors, not only for the ash pits of new power houses but also for old plants.

Consulting engineers and architects are often required to draw detailed specifications for ash-pit doors, because they have been unable to find a satisfactory article on the market as a standard piece of equipment. Contractors engaged in setting boilers are also often required to construct a cheap steel door on the job because they had been unable to purchase a good cast-iron door especially designed for the purpose.

It has been the experience of ash-disposal engineers that an ash-pit door should be of ample size to allow easy removal of the ashes from the pit, but should not be unnecessarily large. If too large it is impossible to keep the door from warping and thus leaking air, and it is also too heavy to be handled easily. A 24″ x 36″ door is ample for the largest pit, and this is the size recommended for ordinary use. Three other sizes of doors are also built of the same general design. These are in sizes 18″x18″, 22″x26″ and 24″x24″.

The frame of this ash-pit door is of castiron of ample strength for all conditions, with the hinge and locking lugs cast on. The frame is of an angle design and sets well back into the setting. It is easily fastened into the pit wall by four bolts—one in each corner. The bearing surface is carefully machined. The hinge lugs are of ample strength to meet the hard usage to which these doors are subjected in operation.

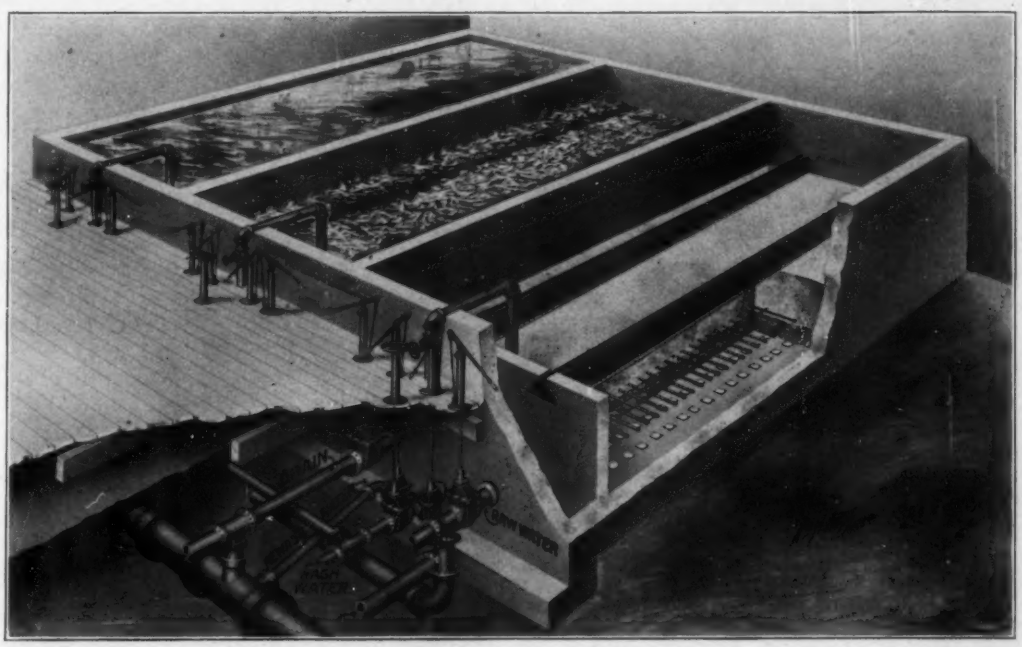
The door itself is of heavy cast iron and is provided with a heavy ventilated cast iron liner to prevent contact with the hot ashes and consequent warping. The bearing surface of the door is also carefully machined to make an airtight joint with the frame.

The hinges are of the floating type and two are provided. The hinge bars are pivoted to the frame and carry the door at the center where it is pivoted to the bars. This gives a perfectly distributed pressure over the door and keeps a tight joint at all points with no possibility of a clinker in the corner of the frame opening, breaking or bending the door by a wedge action. It also allows the door to be swung entirely out of the operator's way.

This door is easily, quickly and tightly locked by means of the wing nuts at the end of the hinge bars. In the case of the 24″x36″ door, two locks are used. The other sizes have but one locking lug.

Additional information will be gladly furnished by the manufacturers, American Steam Conveyor Corp., Chicago and New York.

Hungerford Filters



GRAVITY FILTER

¶ We are prepared to supply at short notice Rectangular Concrete Filters of the Air-Wash type, Circular Wood-Tank Filters of the Air-Wash or Revolving Wash-Rake type, and Pressure Filters.

¶ A special Concrete Filter low in first cost, economical in operation and high in efficiency will interest you.

¶ Hungerford Filters having a combined capacity of two hundred and seventy-five million gallons per day now in operation.

Write for particulars of new paper mill Filter

HUNGERFORD & TERRY, Inc.

1112 Pennsylvania Building PHILADELPHIA, PA.

Plate Press Felts

There is no better Plate Press Felt made than the "HAMILTON."

A trial is invited.

Satisfaction always guaranteed.

SHULER & BENNINGHOFEN
HAMILTON, OHIO

H. O. NUMAN

Barking Drums

Green Bay, Wis.

The Stickle Automatic Steam Control for Paper Machines

WE wish to emphasize the word "automatic." This with us means that the steam follows changes that come to the sheet from free to hard drying stock or any ordinary changes in weights. A control that does not do this in itself is not automatic. This makes a better sheet of paper. We guarantee to hold the moisture at any point you wish with ½ of 1% change. Furnished on 60 days' approval.

OPEN COIL HEATER & PURIFIER CO.
INDIANAPOLIS, IND.
BOSTON PHILADELPHIA

Pocket CO_2 Indicator

A reliable indication of the character of combustion in any furnace is the percentage of CO_2 in the gases of combustion. The higher the latter can be raised, the greater will be the economy in fuel. For the complete combustion of coal, gas, oil, or any other fuel, a certain definite quantity of air is necessary. Too little air will result in a portion of the heat value of the fuel going up the stack unconsumed, and in being entirely wasted. The other extreme, however, is usually experienced in the average furnace. Too much air is supplied, which results in a cooling down of the furnace gases; at the same time the temperature of the excess air has to be raised from room temperature to that of the stack, usually 500 deg. fahr. or more, which is an absolute waste.

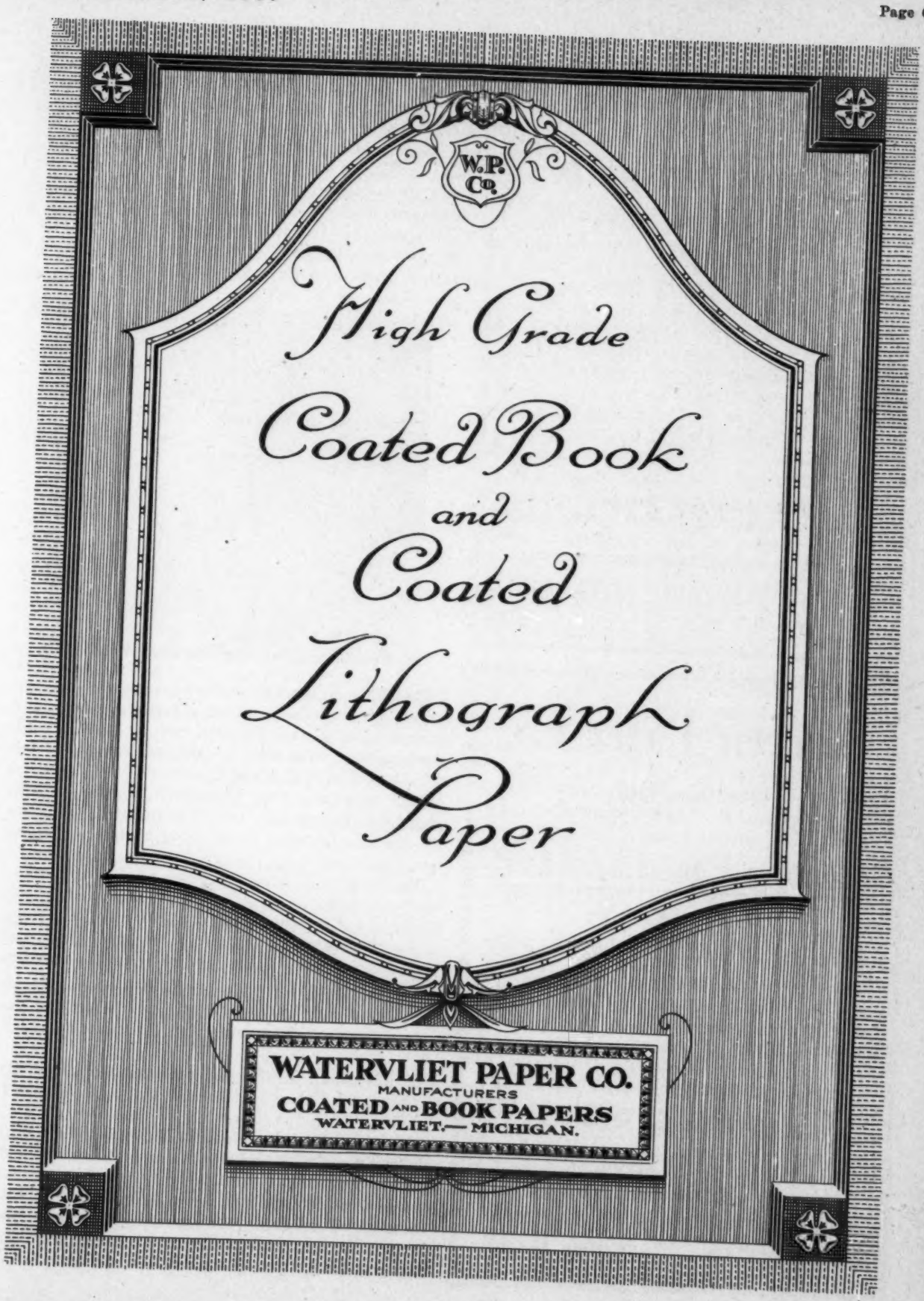
In the Pocket CO_2 Indicator shown in the accompanying illustration a device has been perfected which is exceedingly simple, quick in action and does not require any elaborate setting up and preparation as in apparatus used so far.

A test requires about two and one-half minutes, and one may go from one furnace to another making tests at the rate of twenty an hour. The Bureau of Mines says in Bulletin 91, page 50: "Seventeen to twenty analyses per hour can be made with this instrument. With ordinary care an analysis can be made with a maximum error of 0.2 per cent. The reagent is a solution of potassium hydroxide in water. Several hundred analyses can be made with one charge of the caustic. The device is compact and portable.

The device is made by the Bacharach Industrial Instrument Co., Pittsburgh, Pa., who will be pleased to send complete details to any one interested.

To Prevent Belts from Slipping

Belting gradually accumulates oil and grease and begins to slip, losing its efficiency. So-called belt dressing is then applied and this only aggravates the trouble, and in time ruins the belting. By sprinkling some fullers earth (from a large salt shaker) on your belt when it shows a tendency to slip, you will overcome this trouble and increase the life of your belt, as it absorbs the oil without any injurious effects.


W.P. Co.
High Grade
Coated Book
and
Coated
Lithograph
Paper
WATERVLIET PAPER CO.
MANUFACTURERS
COATED AND BOOK PAPERS
WATERVLIET,— MICHIGAN.

WOLVERINE
Paper Company

"Wolverine"
Waxed Papers
for Every Requirement

Best Quality

Waxed Tissue a Specialty

OTSEGO, MICHIGAN

Bardeen Paper Co.
Otsego, Mich.

Printing Papers of Merit

Porcelain, Peninsular and Purity Enamel Book

M.F. and S&SC Book and Catalog

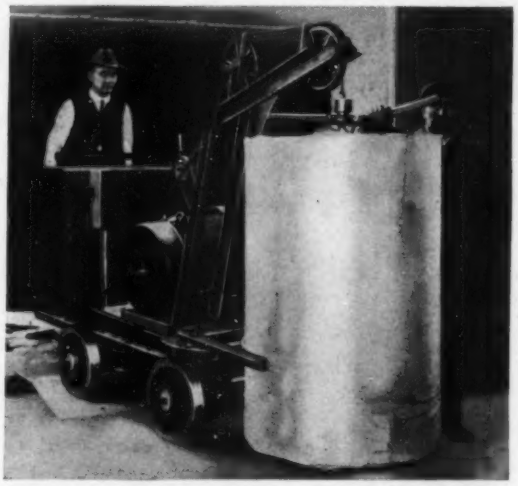
English Finish Opaque

Coated Blanks
Post Card Translucent
Offset Blanks Offset Bristol

Paper Handling Methods

One of the most efficient methods of handling paper packages of both roll and flat stock is the tiering system of handling and storage, two phases of which are illustrated in the accompanying cuts. Over 150 mills and about 125 paper dealers are already using the system quite successfully and others are rapidly coming to recognize its merits.

It is said that this method enables one man to do the work of, sometimes, as many as a dozen according to the circumstances governing the work.



The above illustration shows a combination battery truck and roll hoist used for unloading cars at the warehouse of Sears, Roebuck and Co., at Chicago. The machine lifts and transports thousand-pound rolls, traveling at a speed of six miles per hour.

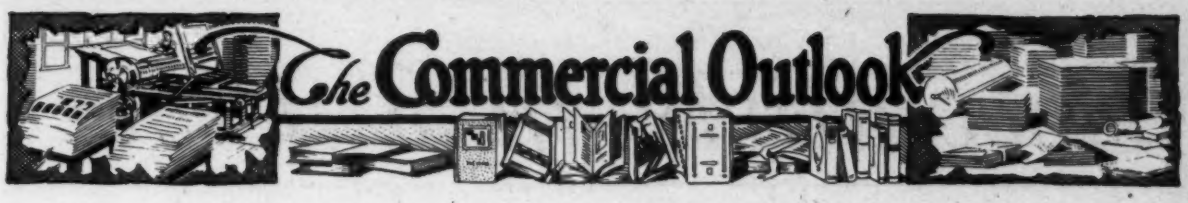
This machine, with two men, unloaded 80,000 pounds of roll paper in thirty-five minutes. Without the machine the same job required the labor of eight men for two hours.

The utilization of waste space by this system is of incalculable value to any firm interested in the handling and storing of paper as the machines allow of handling and piling in very confined spaces or where low ceilings interfere when using ordinary methods.

New Patents

No. 1,297,192. A new paper-making machine. By James H. LeRoy and Ray G. Repman, Shawano, Wis. 1 claim.

"In a paper making machine of the class described, the combination of upper and couch rolls, upper and lower press rolls, a drier, a pressure roll below the drier, a suction roll and a single endless felt, said endless felt passing between the couch rolls, the press rolls, between the pressure roll and drier and also engaging the suction roll."



(Special to THE PAPER INDUSTRY)

THE paper manufacturers have been undergoing a very severe grilling for the last three months, the tremendous slaughter in prices has necessitated the most intensive retrenchment so as they might be able to run their business and keep their organizations together without serious losses.

Why this condition should exist in the paper industry is beyond explanation as there are apparently no sound economic reasons for its existence, as all other commodities are holding up in price and some actually advancing, especially is this true of raw materials and labor which are as high if not higher than before the prices of paper crumpled up and disappeared. That is virtually what has happened; for apparently no explicable reason the prices of paper have tumbled in the last ninety days until no such thing as price existed and for no evident cause, conditions in the last week have taken a turn for the best, of course it is nowhere near normal as yet, but conditions have stabilized enough so as to make it possible to state a price on the majority of papers.

This has helped considerably as there is some demand now that the prices are on the upturn. In this particular phase of the matter, the old adage of, "buying on a rising market" worked right up to form as no one bought anything, but absolute necessities while the prices were dropping, in fact it was almost impossible to sell paper while this condition existed.

The big question in the minds of the buyers of Boxboard today is to decide whether the prices on this material have reached the bottom and the same thought has been uppermost in their minds for the last few months or in fact since the price of boards started on its decline in November. During this period they have bought only the bare necessities and are now ready to buy as soon as the market indicates stability with rising prices.

After talking with many manufacturers in this line during the last few weeks, I am satisfied that the present quotations in most instances are below cost, many mills have continued to run in order to keep their organization together, at the same time hoping for improved conditions to come to their rescue.

While the market prices today are probably from 25% to 30% higher than the prices of a few years ago, the margin of profit is much less due to the higher prices of raw materials and the increases in the wage scale for labor. Any further decline upon the price of paper boards will depend upon the decline of raw materials and labor costs.

A decline in the price of labor is conceded out of question and as far as the raw materials are concerned, it appears the bottom has already been reached as the demand for raw material is more steady and substantial today than it was even thirty days ago. The same is now true of the manufactured product due to the fact that the stocks in the hands of consumers have been reduced to such a point that the buyers are now in the market for very appreciable quantities to fill their immediate needs.

This increased demand will stimulate buying from all quarters as buyers only come out strongly when there is a rising market, also because quite a few shrewd buyers realize that the prices are now below costs in the majority of instances. Those who were fortunate enough to place their orders in the last few weeks, at the prevailing prices, have taken no chance, in fact they have made a good buy.

The present market indicates a good demand with advancing prices for the cheaper grades, and as this is always a good barometer of conditions, it points to the end of the lull in board consumption caused by readjustment and all the other grades will follow the upward trend of the cheaper varieties in the same proportion.

Consumption of paper box board is about 25% greater today than it was 60 days ago, and will no doubt continue to increase rapidly so that normal conditions will be re-established in the near future, in fact the writer looks forward to exceedingly good business for the last half of the present year.

(Special to THE PAPER INDUSTRY)

New York, April 19.—**Paper:** While the market for paper has not assumed the broad proportions many were prone to expect would prevail at this time, it can be said that substantially more activity is in evidence than for some months. Buyers appear to be imbued with confidence that prices are destined to decline further and consequently are operating in an ultra-conservative fashion, placing orders solely for amounts they directly need. Local merchants report that, on the whole, they are transacting a fair volume of business, but that there is still the same cautiousness shown by consumers in purchasing that has been in vogue since the signing of the armistice, and that it is clearly apparent on all sides that such supplies as are being bought are for

(*Continued on page 69*)

Specialists in 3 Lines

Perkins Ventilating Fans and Machine Room Ventilating Systems

Used in Leading Mills throughout this country, Canada and Mexico

Perkins Patented Splined Paper and Cotton Calender Rolls

With Unique Advantages distinguishing them from all other Calender Rolls

The Mullen Paper Testers and Jumbo Mullen Testers

Standard of the United States Government and the Paper Trade of America

B. F. PERKINS & SON, Inc.

Sole Manufacturers

Holyoke, Mass. U. S. A.

300

DAILY CAPACITY IN TONS

Standard Grades of Paper Boards

MANUFACTURED BY

ALTON BOX BOARD & PAPER COMPANY

CHICAGO COATED BOARD COMPANY

SALES DEPARTMENT
Office: 1520 Lumber Exchange Building
CHICAGO, ILL.

F. D. WILSON, Sales Manager
Address all communications regarding sales to this office

(*Continued from page 67*)

immediate use. Stocks owned by consumers are doubtless at a low ebb, and belief in this direction leads jobbers to anticipate a consistent though gradual expansion of demand as the requirements of buyers increase.

The most active grades of paper at present are news print and book. This is due primarily to the boom in newspaper and magazine advertising which started a month or two ago and which has been growing at a rapid rate. Publishers are not only anxiously calling for their full contract supplies of news print, but are repeatedly coming into the market for additional tonnages. The same situation exists in the book paper market, and dealers and mills are being called upon to furnish larger and larger supplies to their customers. Writing papers are comparatively quiet. There is a moderate demand for the cheaper qualities of bonds and ledgers, but current buying is being confined to hand-to-mouth quantities directly required by consumers. Wrappings also are moving only in restricted volume and prices are gradually seeking higher levels. Tissues are firmly quoted and are sought in fairly large lots. Boards are daily increasing in demand and quotations are on the uptrend.

Viewing the market as a whole, prevailing conditions are far more satisfactory than they have been at any time during the period of after-the-war stabilization. Indications are that the improvement will continue to be slow but that it will be consistently maintained. At every turn, one sees signs of an increased consumption of paper, which, of course, is bound to result in a larger demand. Then, too, export trade in paper is steadily broadening, and this doubtless will play an important part in the position of the market not alone in the immediate future, but for a long time to come.

(Special to THE PAPER INDUSTRY)

Cincinnati.—During the last three weeks there has been considerable improvement in both the paper and paper board business. The purchasers have used up their stock on hand and nearly all the orders being placed are for immediate delivery which in itself would indicate a healthy condition of the market.

Many concerns bought heavily before the armistice, anticipating difficulty in fulfilling their requirements during the past winter, these accumulated stocks have been the cause of holding back the placing of additional orders, but now the consumer is coming back with a demand for replacement and will materially improve conditions from now on.

The bottom has been reached in the paper market, and prices are now well advanced toward normal. This will allow the mills that closed down, rather than run at a serious loss, to resume operation.

(Special to THE PAPER INDUSTRY)

Birmingham, Ala.—The prices have stabilized considerbly in the last few weeks, and indications are that there is going to be a great deal of paper used during the balance of this year. The present quotations are:

Water finished fibre, 5½ to 6½c.
Kraft papers, 8 to 10c.
Dry sulphite, 7½ to 9c.
M. G. papers, 7½ to 10c.

The Hadley Corp. Mill, at Hadley, New York, consisting of three paper making machines of 64", 74" and 101", resepectively, also a ground wood pulp mill with one machine has been acquired by the Nuera Paper Company who are now putting through an extensive repairing and remodeling program under the supervision of Mr. Gould, formerly with the Hoboken Paper Mills.

It has not as yet been decided what kind of product that mill will produce as the improvements will not be completed until about the middle of May, when it will be ready to begin operations as one of the best equipped mills in the East.

The American Straw Board Co. has disposed of its mill at Norwich, Connecticut, to the Ironsides Board Corporation. After a thorough overhauling it will begin operation under the new management about May 1st.

REX
Paper Company

Manufacturers of

Coated and Offset
Papers

Kalamazoo, Michigan

New Papers

Writing—	
White rag	15- 35
White sulphite, No. 1	11- 25
Colored	12½-17
Ledger—	
White rag	18- 38½
White sulphite	18- ..
Colored sulphite	19½-..
Colored rag	21- ..
Bonds—	
White rag	15- 45
White sulphite	12- 20
Colored sulphite	13- 25
Colored rag	15- 45
Book—	
No. 1 S. & S. C.	7.75- 8.50
Machine finished	7.50- 8.25
English finished	8.00-12.00
Coated and enamel	9.50-13.00
Lithograph	10.00-12.00
News Print—	
Rolls, contract	3.75- 4.00
Rolls, transient	4.00- 4.25
Sheets	4.50- 5.00
Side runs	3.75- 4.00
Standard natural rolls	3.75- 4.25
Cover Stock—	
Coated, both sides	12.25-.....
Coated, one side	12.00-.....
Wrappings—	
No. 1 kraft	7.25- 7.50
No. 2 kraft	6.25- 6.50

Boards—	New York	Chicago
News	45.00-52.50	45.00-47.00
Straw	40.00-45.00	35.00-37.50
Plain chip	37.50-42.50	40.00-42.50
White coated chip	60.00-65.00	60.00-62.50
Manila coated chip	60.00-65.00	60.00-62.50
Binders board	70.00-75.00	70.00-75.00

Mechanical Pulp

Little activity of an important scope is perceptible in the ground wood market. Consumers are absorbing moderate-sized tonnages as their needs develop, but supplies appear to be in excess of the demand, which makes for an easy tone to prices. Various quotations are named, but the most common figure asked is $27 per ton at the grinding mill for No. 1 freshly ground all-spruce pulp. Sales are reported from time to time, however, at recessions from this price.

Chemical Pulp

The market for chemical pulp rules comparatively quiet. Scattered sales are being made of both foreign and domestic pulp, but the aggregate amount moving toward consumers is light, and there are apparently more sellers than buyers. Little Scandinavian pulp is coming in owing to the high prices prevailing on the other side and other difficulties such as lack of shipping room, cable delays and the frozen Baltic which tend to discourage importers from operating for the present. Nevertheless, holders of foreign pulp on dock or in the warehouses here are experiencing trouble in locating buyers except for occasional small-lot parcels, and quotations have been repeatedly lowered during the past fortnight. Demand for domestic grades is relatively little better than that for imported pulp, and manufacturers invariably find it imperative to grant price concessions to effect sales. Quotations ex dock and f.o.b. mills are as follows:

Domestic—	
Bleached sulphite	5.50-5.75
Unbleached sulphite, news grade	3.25-3.50
Easy bleaching sulphite	4.25-4.50
Soda bleached	4.25-4.50
Kraft, No. 1	4.25-4.50

New Invention

No. 1,297,304. Machine for making lathboard. Silas M. Ford, St. Paul, Minn. 4 claims.

(1) "In a machine for making lath-board, the combination with other forming means adapted to form material into lath-board having a series of lath-like faces, and intermediate depressions, of means adapted to form a lath-like face of a width substantially double that of the other lath-like faces.

(2) "In a machine for making lath-board the combination of means for forming paper into lath-board having a series of lath-like faces and intermediate depressions and having one of said lath-like faces of greater width than the remainder and cutting means for cutting said lath-board across said wider lath-like face."

(4) "In a machine for making lath-board an endless belt comprised of a series of transverse forming cleats each of said forming cleats being composed of multiple punchings placed side by side and strung into a transverse rod, multiple connecting links, connecting said cleats in hinged relation, thereby forming a substantially solid metal belt having cleats extending transversely thereof."

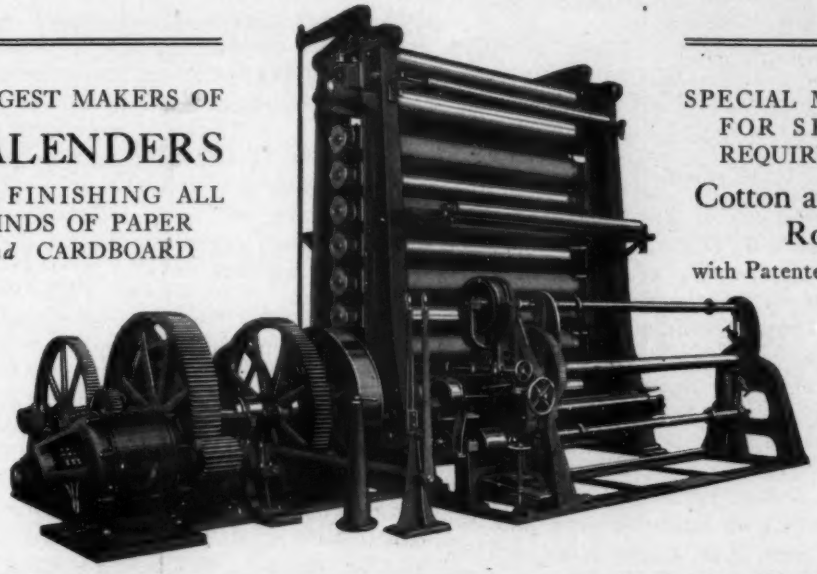
Holyoke Machine Co. HOLYOKE MASS.

Makers of Improved Machinery for Wood Pulp & Paper Mills

LARGEST MAKERS OF

CALENDERS

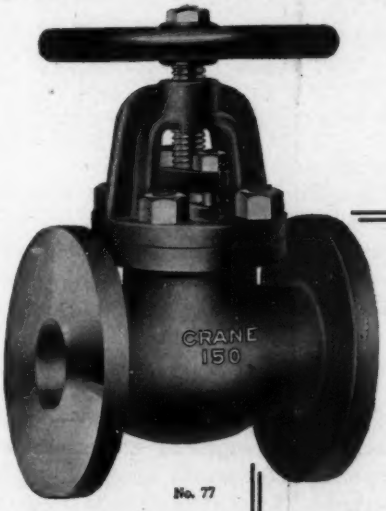
FOR FINISHING ALL KINDS OF PAPER *and* CARDBOARD



SPECIAL MACHINES FOR SPECIAL REQUIREMENTS

Cotton and Paper Rolls

with Patented Fastenings



No. 77

CRANE

Medium

All Brass ——— O. S. & Y.

Globe and Angle Valves

can be made in acid metal to suit conditions.

This type of valve, having the stem threads exposed, and having renewable seat and disc, will reduce the up-keep cost to a minimum.

There is a Crane branch near you.

Chicago — **CRANE CO.** — Bridgeport

Branches in 53 leading cities.

Papermaking Rags

The rag market is equally as quiet as it has been for the past several months. Consumers for the most part display a lack of interest in offerings unless the prices named are highly attractive, and local dealers are a unit in describing business conditions as very unsatisfactory. Paper mills apparently have fair-sized stocks on hand and seem determined to liquidate their holdings before coming into the market to replenish supplies, with the result that current trading consists of scattered transactions involving small quantities immediately needed. Prices are maintained with fair firmness, but this is due more to the refusal of dealers to reduce quotations than to the demand from manufacturing sources, so that values actually are mainly nominal. Sales of repacked thirds and blues are reported at 3.00 to 3.25 cents f.o.b. New York, while No. 1 white shirt cuttings are selling in scattered directions at around 10.25 cents New York, street soiled whites at 3.00 cents and No. 1 repacked old whites at 5.50 cents. The demand for roofing rags is especially dull, and such supplies as are being absorbed are bringing only about 1.50 cents per pound New York for No. 1 packing. Quotations f.o.b. New York to mills are:

	New York and Chicago
New Stock—	
White shirt cuttings, No. 1	10.00-10.25
White shirt cuttings, No. 2	7.00- 7.25
Fancy shirt cuttings	8.00- 8.25
Washables, No. 1	6.75- 7.00
Unbleached muslins	9.00- 9.50
White lawns	9.00- 9.25
Overall cuttings, blue	8.00- 8.25
Black silesias	4.50- 4.75
Old Stock—	
Whites, No. 1 repacked	5.50- 5.75
Whites, No. 2 repacked	4.00- 4.25
Whites, house soiled	3.10- 3.25
Whites, street soiled	2.90- 3.00
Thirds and blues, repacked	3.00- 3.25
Thirds and blues, rough	2.60- 2.75
Black stockings	2.65- 2.75
Lace curtains	6.00- 6.25
Cotton canvas, No. 1	4.75- 5.00
White cotton batting	4.75- 5.00
Roofing, No. 1	1.50- 1.60
Roofing, No. 2	1.30- 1.40

Old Papers

The chief activity in the old paper market at present is the purchasing of the low grades by box board manufacturers. Business of good volume is being done in newspapers, mixed papers, board cuttings and similar descriptions and at rising prices, but demand for the better grades is decidedly slow and values are receding. Shavings are in an almost lifeless position, with sales of more than a carload at a time a rarity. Books and magazines are in moderate call, and there is a limited movement of kraft and manila papers, but manufacturers are reluctant to pay the prices asked by dealers and this puts a quietus on trading.

	New York	Chicago
Hard white shavings, No. 1	4.50-4.75	4.75-5.00
Hard white shavings, No. 2	4.25-4.40	4.30-4.60
Soft white shavings	3.40-3.60	3.75-4.00
Heavy book, No. 1	1.55-1.80	1.75-1.85
Colored shavings	1.25-1.35	1.40-1.50
Heavy flat stock, No. 1	1.25-1.35	1.25-1.35
Crumpled, No. 1	1.05-1.15	1.10-1.20
Ledger stock	2.60-2.80	2.50-2.60
Kraft, No. 1	2.15-2.25	2.15-2.25
Manilas, No. 1	.90-1.00	1.00-1.10
White blank news	1.00-1.10	1.05-1.10
Overissue news, No. 1	.90- .95	.90- .95
Folded news	.55- .60	.65- .75
Mill wrappers	.80- .90	.80- .90
Box board cuttings	.55- .60	.55- .60
Mixed paper, No. 1	.47½-.52½	.50- .60
Common paper	.35- .40	.37½-.42½

Rope and Bagging

Comparatively speaking, there is a good demand for old Manila rope emanating from papermaking sources. Rope paper mills are placing orders with considerable freedom, and while individual transactions involve rather small parcels, the total amount of rope moving into consuming channels is fairly large. Prices are established at a basis of about 4 cents per pound f.o.b. New York for strictly No. 1 rope, with sales reported now and then at slightly higher levels. Bagging is sought by manufacturers in a restricted manner and current sales seldom involve sizable tonnages.

	New York and Chicago
Gunny, No. 1 domestic	2.75-3.00
Gunny, No. 1 foreign	3.00-3.25
Scrap bagging, No. 1	2.10-2.25
Roofing bagging	1.30-1.40
Wool tares, heavy	2.75-3.00
Wool tares, light	2.60-2.75
Manila rope, No. 1 foreign	4.00-4.25
Manila rope, No. 1 domestic	4.00-4.25
Sisal strings	2.00-2.25
Mixed strings	2.00-2.25

(Continued on page 74)

Eagle Knife and Bar Works

John W. Bolton & Sons, Inc.

HIGH GRADE

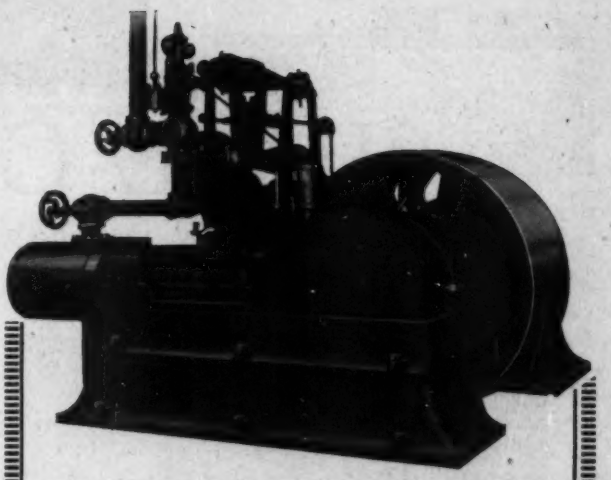
Knives, Bars, Plates and Jordan Fillings

Of Every Description

High Grade Steel Products for Use in Paper Mills.

John W. Bolton & Sons, Inc.

LAWRENCE, MASS.



Variable and Constant SPEED ENGINES

Paper Mill Economy is assisted very materially by the installation of High Grade Variable Speed and Constant Speed Engines.

Send for List of Installations and Catalogs

CHANDLER & TAYLOR COMPANY
Indianapolis, Indiana

Efficiency——Reliability——Durability

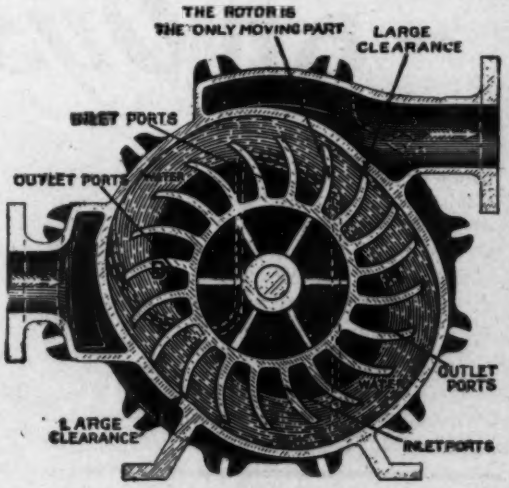
ARE CHARACTERISTICS OF THE

Nash Hydro-Turbine Vacuum Pumps

Nash Hydro-Turbine Air Compressors

Jennings Hydro-Turbine Dryer Exhaust Units

Minimum Cost, Maintenance and Repair with Maximum Power



FOR FULL PARTICULARS ADDRESS

THOMAS H. SAVERY, Jr. 1718 Republic Building Chicago, Illinois

THE HILL CLUTCH CO.

"HILL CLUTCH"

IS FOUND CAST UPON THE POWER TRANSMISSION MACHINERY

in the

Modern Paper Mill

Line Shaft Supported in Hill Collar Oiling Bearings and Driving Paper Machines in one of the Mills of THE RIVER RAISIN PAPER CO.

From the Atlantic to the Pacific and from Canada to the Gulf of Mexico—wherever Paper or Pulp is manufactured—the products of THE HILL CLUTCH CO. are favorably known.

Catalog upon request

THE HILL CLUTCH CO.
Cleveland, Ohio
New York Office—50 Church St.

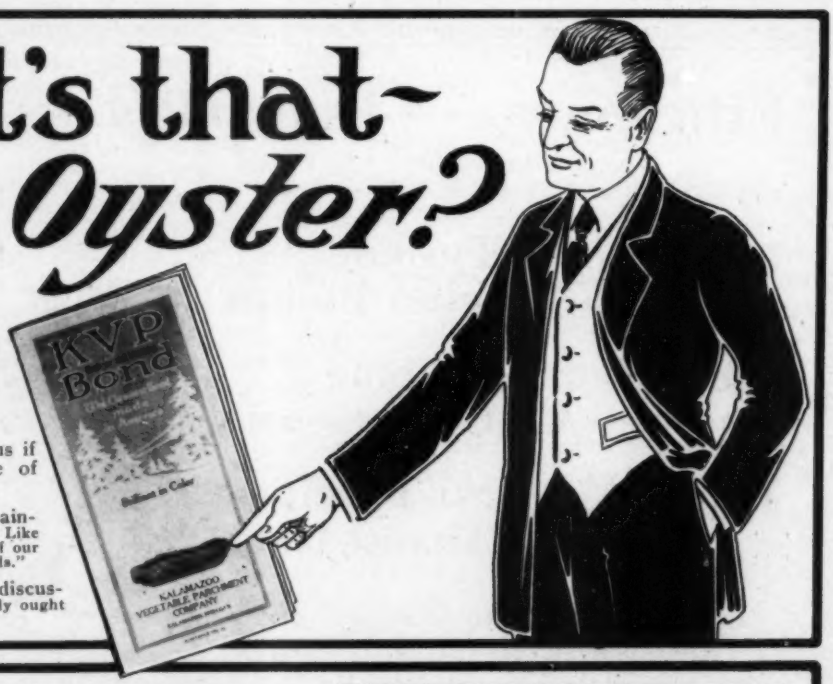
What's that—an *Oyster?*

The great, new KVP mill "lost" some of its detail in this second reproduction, and a genial friend of ours (at least he smiled like a friend) asked us "What's that—an oyster?"

Thank heavens he didn't ask us if it was "a hypoblastic vesicle of protoplasm"!

An oyster produces from its painful problem the pearl of great price. Like the oyster we developed from one of our problems the "pearl of printing bonds."

We will not bore you with a discussion of the problem—but you certainly ought to be interested in KVP Bond.



KVP Bond is the printer's pearl of *little* price

on which wonderful results are being produced with halftones. It is an inexpensive bond, beautiful in color and finish—just how well it prints up, we'll show you if you write for booklet.

Don't you be an oyster! Open up and write.

Kalamazoo Vegetable Parchment Company • Kalamazoo • Michigan

Makers of Vegetable Parchment, Waxed and Bond Papers

(Special to THE PAPER INDUSTRY)

New York, April 15—**Paper:** Present importations of paper are largely confined to cigarette paper. Some supplies of tissue, hanging and filter paper are coming in from European countries, but in the aggregate, importations are considerable below normal and need cause domestic manufacturers no apprehension. Manufacturing conditions on the other side, it is authoritatively stated, are such that there seems little probability of any appreciable amounts of paper, aside from specialities, being shipped to America for a long time. Individual consignments arriving here since March 15 are as follows:

Cigarette

Liggett & Meyers Tobacco Co., 23 cs.
Irving National Bank, 28 cs.

Tissue

G. W. Sheldon & Co., 10 cs.
Rose & Frank Co., 28 cs.
States Machinery Co., 10 bls.

Hanging

W. H. S. Lloyd & Co., 26 bls.
F. L. Kraemer & Co., 11 bls.

Filter

Lunham & Moore, 16 cs.

Miscellaneous

New York Blue Print Paper Co., 16 cs.
H. Lips, 485 cs.
Defiance Mfg. Co., 30 cs.
Lunham & Moore, 31 cs.
Bowring & Co., 130 bls.
T. Meadows & Co., 86 bls.
B. F. Drakenfeld & Co., 63 cs.
Oxford University Press, 11 cs.
E. Dretzgey & Co., 34 cs.
P. J. Schweitzer, 47 cs.
Royal Baking Powder Co., 68 cs.
A. C. Dodman, Jr., 3 bls.
F. L. Kraemer & Co., 21 bls.
Rose & Frank Co., 15 cs.
J. W. Hampton, Jr., 2 cs.
H. Baker & Co., 25 cs.
A. Roberts, 5 cs.
W. McLaughlin, 5 cs.
B. E. Teale, 36 cs.
E. Beers & Co., 14 cs.
H. R. Angell & Co., 18 cs.
A. Sanderson & Co., 3 bls.
The Prager Co., 887 bls.

Wood Pulp: Prices ruling on chemical pulps in the Scandinavian countries are beyond a parity with current market quotations here, and this, together with the slight demand prevailing in this market, keeps import business on a narrow scale. Some lots of course are arriving now and then, but the great bulk of pulp which has reached here from Norway and Sweden during the past few months has been on contract, and dock and warehouse stocks have doubtless decreased rather than become augmented. Local importing firms report transacting some business on contract for forward shipment, and trade of this character is about all that is being done, as importers appear unwilling to bring supplies in on consignment. Receipts and prices during the past month are as follows:

American Woodpulp Corp., 225 bls. from Copenhagen.

Tidewater Paper Mills, 3,195 from St. Johns, N. F.

Foreign Pulp Prices

Bleached sulphite	8.00-8.50
Unbleached sulphite	4.50-4.75
Easy bleaching sulphite	5.00-5.50
Mitscherlich unbleached	5.50-5.75
Scandinavian kraft	4.50-4.75

Paper Stock: Old rope, scrap bagging and roofing rags constitute the bulk of papermaking materials now being received here from foreign sources. Imports of old Manila rope have undergone a notable increase recently, and it is reliably said that orders have gone forward for additional large shipments. Scrap burlap and gunny bagging also is arriving in heavier tonnage than at any time since pre-war days. Several sizable shipments of feltmaking rags have been received, but aside from these, few rags are coming in. France still maintains an export embargo on rags, which prevents importers here from operating in that country, while the demand for the high quality grades of rag stock in England is said to be greater than the available supply, with the result prices prevailing there are too high for buyers in this market to consider. Very few rags are coming in from Spain, Italy or Holland, but expectations are conditions will soon become sufficiently stabilized in those countries to permit importers to operate with less difficulty. Arrivals at this port since March 15 follow:

Old Rope

Brown Bros. & Co., 146 coils from Hull, and 167 coils from Bristol.

International Purchasing Co., 93 coils from Hull.

Sanderson & Son, 12 coils from Hull.

(*Continued on page 77*)

R.J. DOWD KNIFE WORKS · EST'B · MACHINE KNIVES · 1847 · BELOIT WIS

CLUSTER FILLINGS

is a type of Beater Roll filling which we install in any beater engine. It is put in as are ordinary Beater Bars. The same rings are used. A mill using sulphate or sulphite stock cannot afford to do without **Cluster Filling.** Where mechanical wood pulp is employed, less sulphite is required to give the needed strength, since a **Cluster filled roll** furnishes a longer fibered stock than other rolls.

These rolls have attained great success in fiber mills, particularly in tissue and kraft mills, and they are in use in many mills from Maine to California. Some mills have installed as many as nine sets of **Cluster Filling.**

If you desire to make stronger paper this equipment will help you attain the desired end.

COVERED BY LETTERS PATENT

Manufacturers of All Styles of Beater Roll Bars, Bed Plates, and Knives Used in Paper and Pulp Mills

A PART OF OUR KNIFE LIST

Barker	*Cope*	*Hog Planer*	*Rag*	*Paper Cutting*	*Roll Bars*
Bark Mill	*Chipper*	*Lithograph*	*Stereotype*	*Shear Blades*	*Bed Plates*
			Straw Cutter		

R.J. Dowd Knife Works

Makers of better cutting knives since 1847

Beloit, Wis.

Bagging

Maurice O'Meara Co., 131 bls. from London.

Rags

Edwin Butterworth & Co., 93 bls. from Havre.

Joseph & Miller, 9 bls. from St. Johns, N. F.

Castle, Gottheil & Overton, 350 bls. from Rotterdam.

Miscellaneous

Castle, Gottheil & Overton, 46 bls. thread waste from Leith.

I. H. Franks, 14 bls. thread waste from Leith.

Foreign Trade Opportunities

A merchant in Belgium desires to be placed in communication with manufacturers of paper, with a view to securing an agency in that country. For further data those interested should communicate with the Bureau of Foreign and Domestic Commerce, Washington, D. C., referring to Inquiry No. 28634.

A commercial agent in France desires to secure an agency for the sale of wall paper. For further data those interested should communicate with the Bureau of Foreign and Domestic Commerce, Washington, D. C., referring to Inquiry No. 28720.

A firm in Belgium wishes to secure an agency from manufacturers and exporters for the sale of small articles of paper. For further data those interested should communicate with the Bureau of Foreign and Domestic Commerce, Washington, D. C., referring to Inquiry No. 28676.

A man in Italy wishes to secure an agency for the sale of felts and for paper mills. Correspondence may be in English. For further data those interested should communicate with the Bureau of Foreign and Domestic Commerce, Washington, D. C., referring to Inquiry No. 28818.

A company in Italy wishes to be placed in communication with firms for the purpose of securing agencies for the sale of paper and stationery. Correspondence may be in English. For further data those interested should communicate with the Bureau of Foreign and Domestic Commerce, Washington, D. C., referring to Inquiry No. 28976.

A firm in France desires to secure an exclusive agency for wrapping paper. Terms of payment cash against documents, 30 days. Correspondence should be in French. References. For further data those interested should communicate with the Bureau of Foreign and Domestic Commerce, Washington, D. C., referring to Inquiry No. 28896.

A company in Switzerland desires to purchase or secure an agency for the sale of wall paper. Correspondence may be in English. References. For further data those interested should communicate with the Bureau of Foreign and Domestic Commerce, Washington, D. C., referring to Inquiry No. 28915.

News Personals

(Special to THE PAPER INDUSTRY)

New York, April 15—Quite a few changes have occurred in the organizations of local mill, jobbing and supply firms within the past several weeks. One of the most important is the appointment of Lowell J. Whiteford as manager and purchasing agent of the Charles F. Hubbs & Company, paper dealers, of 383 Lafayette street, who succeeds J. C. Mallalieu, resigned. Mr. Whiteford was at one time connected with the Dexter Sulphite Pulp and Paper Company.

Hugo Christiansen, formerly sales manager in the Middle West for the Yellow Pine Paper Mill Company, Orange, Tex., with offices in Chicago, has joined the organization of the Hart Trading Company, 154 Nassau street, New York, exporters of paper.

Benjamin LaBree, Jr., of the Parsons Trading Company, has been elected vice-president of the American Paper Exports, Inc., 30 Broad street, organized about a year ago by prominent news print manufacturers for the purpose of enlarging and concentrating their export business.

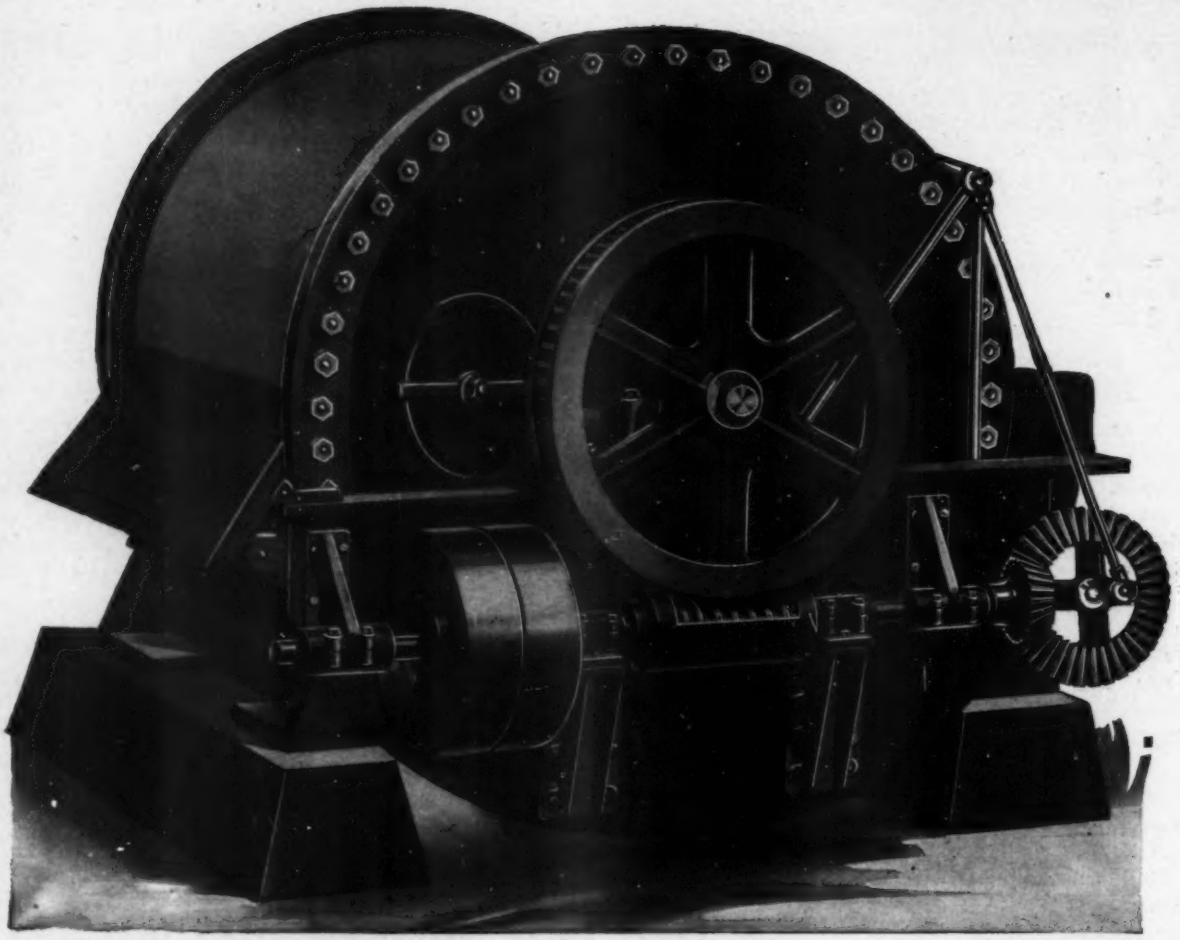
Charles W. Knode has resigned as vice-president of the White-Burbank Paper Company, jobbers, and with William A. Ebbets, a well-known mill representative, has formed a partnership under the name of the Knode-Ebbets Company to act as manufacturers' representatives. The firm's offices are located at 501 Fifth avenue.

J. H. Cashman, formerly purchasing agent of the Robert Gair Company, Brooklyn, is now representing the Pepperell Card and Paper Company, 45 West Thirty-fourth street.

Sigord Sorenson has severed his connections with the Lagerloef Trading Company to assume the management of the wood pulp department of Castle, Gottheil & Overton, 200 Fifth avenue.

Between July 1, 1918, and January 31, 1919, more than 15,000,000 pounds of paper was salvaged by the War Department, according to a report issued by the Director of Purchase and Storage.

On June 30, 1918, salvaged paper on hand totalled 8,809,552 pounds, and 15,262,492 pounds was collected from that date to January 31 last, making the total 24,072,044 pounds. Of this, other army organizations received 233,853 pounds, valued at $1,004, and 11,992,978 pounds, valued at $101,641, was sold. The total value of the paper disposed of was $102,645. The paper on hand—11,845,213 pounds—on January 31 was valued at $29,613.



Hard and Continuous SERVICE

This Improved Rotary Continuous Suction Filter has proven its superiority over all others of its type in handling lime mud from hot caustic solutions from continuous causticizing and lime recovery—Bicarbonate of Soda—Salt from continuous discharge vacuum pans—Kaolin—Feldspar and all other purposes where filters of the revolving type are suitable.

None of the Apparatus we offer is experimental in character, but has successfully met the test of actual service. Our designs embody the results of 25 years' practical operating experience of our Consulting Mechanical and Chemical Engineer, who is at your service.

Glamorgan Pipe & Foundry Company

Lynchburg, Va., U. S. A.

Using the Nationally Famous Virginia Foundry Iron

Buyers' Guide—What and Where to Buy

Equipment, Apparatus, Supplies and Raw Materials Used by the Paper Industry

ANGLE VALES
The Crane Company, Chicago, Ill.

ARCHITECTS
James L. Carey, 208 N. Laramie St., Chicago, Ill.

ASSORTING TABLES
Moore and White Co., Philadelphia, Pa.

ASH CONVEYOR SYSTEMS
American Steam Conveyor Corp., Chicago, Ill.

BARKERS
Holyoke Machine Co., Holyoke, Mass.
Valley Iron Works Co., Appleton, Wis.

BARKING DRUMS
H. O. Numan, Green Bay, Wis.

BEATER BARS
Eagle Knife and Bar Works, Lawrence, Mass.
R. J. Dowd Knife Works, Beloit, Wis.

BEATER BED PLATES
Bahr Bros., Marion, Ind.
Eagle Knife and Bar Works, Lawrence, Mass.

BEATER ROLL FILLING
R. J. Dowd Knife Works, Beloit, Wis.

BEATING, WASHING AND BLEACHING ENGINES
Holyoke Machine Co., Holyoke, Mass.
Valley Iron Works Co., Appleton, Wis.

BLEACHING (Propellers)
Moore and White Co., Philadelphia, Pa.

BLOWERS
Buffalo Steam Pump Co., Buffalo, N. Y.

BRASS WIRE CLOTH
Appleton Wire Works, Appleton, Wis.
Lindsay Wire Weaving Co., Cleveland, Ohio.
Wisconsin Wire Works, Appleton, Wis.

BURRS
Roberts Manufacturing Co., Lockport, N. Y.

CALENDERS
Holyoke Machine Co., Holyoke, Mass.

CALENDER DOCTORS
Ticonderoga Machine Works, Ticonderoga, N. Y.

CALENDER ROLLS
Holyoke Machine Co., Holyoke, Mass.
B. F. Perkins and Son, Inc., Holyoke, Mass.

CALL SYSTEMS
Federal Sign Co., Lake and Desplaines St., Chicago, Ill.

CASE LINING (Waterproof)
National Waterproofing Co., Drexel Bldg., Philadelphia, Pa.

CENTRIFUGAL PUMPS
Buffalo Steam Pump Co., Buffalo, N. Y.
Valley Iron Works Co., Appleton, Wis.

CHIPPERS
Holyoke Machine Co., Holyoke, Mass.
Valley Iron Works Co., Appleton, Wis.

CHIPPER AND BARKER KNIVES
Simonds Manufacturing Co., Fitchburg, Mass.

COAL BURNERS
Thos. H. Savery, Republic Bldg., Chicago, Ill.

CONDENSERS
Buffalo Foundry and Machine Co., Buffalo, N. Y.

CONTINUOUS BEATERS
Claflin Engineering Co., Lancaster, Ohio.

CRANES
Northern Engineering Works, Detroit, Mich.

CUTTING MACHINERY
Moore and White Co., Philadelphia, Pa.

DANDY ROLLS
Appleton Wire Works, Appleton, Wis.
Lindsay Wire Weaving Co., Cleveland, Ohio.
Wisconsin Wire Works, Appleton, Wis.

DECKEL FRAME SUPPORTS
Huband and Nash, Menasha, Wis.

DIGESTER QUARTZ
Wausau Quarts Co., Wausau, Wis.

DRUM WINDERS
Ticonderoga Machine Co., Ticonderoga, N. Y.

DRYERS (Vacuum)
Buffalo Foundry and Machine Co., Buffalo, N. Y.

DRYER FELTS
Shuler and Benninghofen, Hamilton, Ohio.

ELECTRIC FANS
B. F. Perkins and Sons, Inc, Holyoke, Mass.

ELECTRIC HOISTS
Northern Engineering Co., Detroit, Mich.

ELECTRIC SIRENS
Federal Sign Co., Lake and Desplaines St., Chicago, Ill.

ELEVATING TRUCKS
Economy Engineering Co., Chicago, Ill.
Moore and White, Philadelphia, Pa.

ENGINES
Chandler and Taylor, Indianapolis, Ind.
Erie Engine Works, Erie, Pa.

ENGINEERS
James L. Carey, 208 North Laramie St., Chicago, Ill.

EVAPORATORS
Buffalo Foundry and Machine Co., Buffalo, N. Y.

FASTENERS (Screen Plate)
Union Screen Plate Co., Fitchburg, Mass.

FELTS AND JACKETS
Shuler and Benninghofen, Hamilton, Ohio.

FELT AND WIRE GUIDES
Huband and Nash, Menasha, Wis.
Moore & White Co., Philadelphia, Pa.

FOURDRINIER WIRES
Appleton Wire Works, Appleton, Wis.
Lindsay Wire Weaving Co., Cleveland, Ohio.
Wisconsin Wire Works, Appleton, Wis.

FILTRATION MEDIUMS
Wausau Quartz Co., Wausau, Wis.

FILTRATION PLANTS
Hungerford & Terry, Inc., Pennsylvania Bldg., Philadelphia, Pa.
Wm. Graver Tank Works, East Chicago, Ind.
Wm. B. Scaife and Sons Co., Oakmont, Pa.

FILTER (Continuous Suction)
Glamorgan Pipe & Foundry Co., Lynchburg, Va.
Hungerford & Terry, Pennsylvania Building, Philadelphia, Pa.

FRICTION CLUTCHES
The Hill Clutch Co., Cleveland, Ohio.
Moore and White Co., Philadelphia, Pa.

GRINDERS
Holyoke Machine Co., Holyoke, Mass.

HOISTS
Northern Engineering Co., Detroit, Mich.

HYDRAULIC TURBINES
James Leffel and Co., Springfield, Ohio.
Holyoke Machine Co., Holyoke, Mass.

JORDAN ENGINES

JORDAN LININGS
Bahr Bros., Marion, Ind.
Eagle Knife and Bar Works, Lawrence, Mass.

KNIVES
R. J. Dowd Knife Works, Beloit, Wis.
Eagle Knife and Bar Works, Lawrence, Mass.
Simonds Manufacturing Co., Fitchburg, Mass.

LAYBOYS
Moore and White Co., Philadelphia, Pa.

LIFTS
Economy Engineering Co., Chicago, Ill.

LINE SHAFT BEARINGS
The Hill Clutch Co., Cleveland, Ohio.

MACHINE DRYER TEMP. CONTROL
Open Coil Heater and Purifier Co., Indianapolis, Ind.

PAPER BOARDS
F. D. Wilson, 1520 Lumber Exchange Building, Chicago, Ill.

PAPER DISTRIBUTORS
Bermingham and Prosser, Chicago, Ill.
Seaman Paper Co., Chicago, Ill.

PAPER MANUFACTURERS
Bardeen Paper Co., Otsego, Mich.
Lakeside Paper Co., Neenah, Wis.
Rex Paper Co., Kalamazoo, Mich.
The Michigan Paper Co., Plainwell, Mich.
Monarch Paper Co., Kalamazoo, Mich.
Watervliet Paper Co., Watervliet, Mich.
Wausau Sulphate Fibre Co., Mosinee, Wis.
Wheat Paper Co., Elkhart, Ind.
Wolverine Paper Co., Otsego, Mich.

PAPER TESTERS
B. F. Perkins and Son, Inc., Holyoke, Mass.

PARCHMENT MANUFACTURERS
Kalamazoo Vegetable Parchment Co., Kalamazoo, Mich.
Sutherland Paper Co., Kalamazoo, Mich.

POWER TRANSMISSION
The Hill Clutch Co., Cleveland, Ohio.

PULP GRINDERS
Holyoke Machine Co., Holyoke, Mass.

PULP STONE DRESSERS
Roberts Manufacturing Co., Lockport, N. Y.

PULP WASHERS
The Green Bay Foundry and Machine Co., Green Bay, Wis.

PUMPS (Paper)
Buffalo Steam Pump Co., Buffalo, N. Y.

PUMPS (Vacuum)
Buffalo Foundry and Machine Co., Buffalo, N. Y.
Thos. H. Savery, Republic Bldg., Chicago, Ill.

RAG AND PAPER DUSTERS
Holyoke Machine Co., Holyoke, Mass.
Valley Iron Works, Appleton, Wis.

ROLL REWINDERS
Hudson and Sharpe, Green Bay, Wis.

ROTARY FILTER
Glamorgan Pipe & Foundry Co., Lynchburg, Va.

ROTARY SCREEN
Thos. H. Savery, Republic Bldg., Chicago, Ill.

SAVE-ALLS
The Green Bay Foundry and Machine Co., Green Bay, Wis.

SAWS
Simonds Manufacturing Co., Fitchburg, Mass.

SCREEN PLATES
Union Screen Plate Co., Fitchburg, Mass.

SIRENS
Federal Sign Co., Lake and Desplaines St., Chicago, Ill.

SHOWER PIPES
Sandusky Foundry and Machine Co., Sandusky, Ohio.

SLITTING AND REWINDING MACHINERY
Cameron Machine Co., Brooklyn, N. Y.

STEAM JET CONVEYORS
American Steam Conveyor Corp., Chicago, Ill.

STOCK CIRCULATING SYSTEM
Ticonderoga Machine Works, Ticonderoga, N. Y.
Claflin Engineering Co., Lancaster, Ohio.

STOCK PUMPS
Buffalo Steam Pump Co., Buffalo, N. Y.

STOCK SHREDDER
The Green Bay Foundry and Machine Co., Green Bay, Wis.

SUCTION ROLLS
Sandusky Foundry and Machine Co., Sandusky, Ohio.

SULPHUR BURNERS
Valley Iron Works Co., Appleton, Wis.

SPEED CHANGES
Moore and White Co., Philadelphia, Pa.

TIERING MACHINES
Economy Engineering Co., Chicago, Ill.

TURBINES (Water)
James Leffel and Co., Springfield, Ohio.

VACUUM SYSTEMS
Open Coil Heater and Purifier Co., Indianapolis, Ind.

VALVES
The Crane Co., Chicago, Ill.

VARIABLE SPEED ENGINES
Chandler and Taylor, Indianapolis, Ind.
Erie Engine Works, Erie, Pa.

VENTILATING SYSTEMS
Buffalo Steam Pump Co., Buffalo, N. Y.
B. F. Perkins and Son, Inc., Holyoke, Mass.

WATER FILTER
The Green Bay Foundry and Machine Co., Green Bay, Wis.

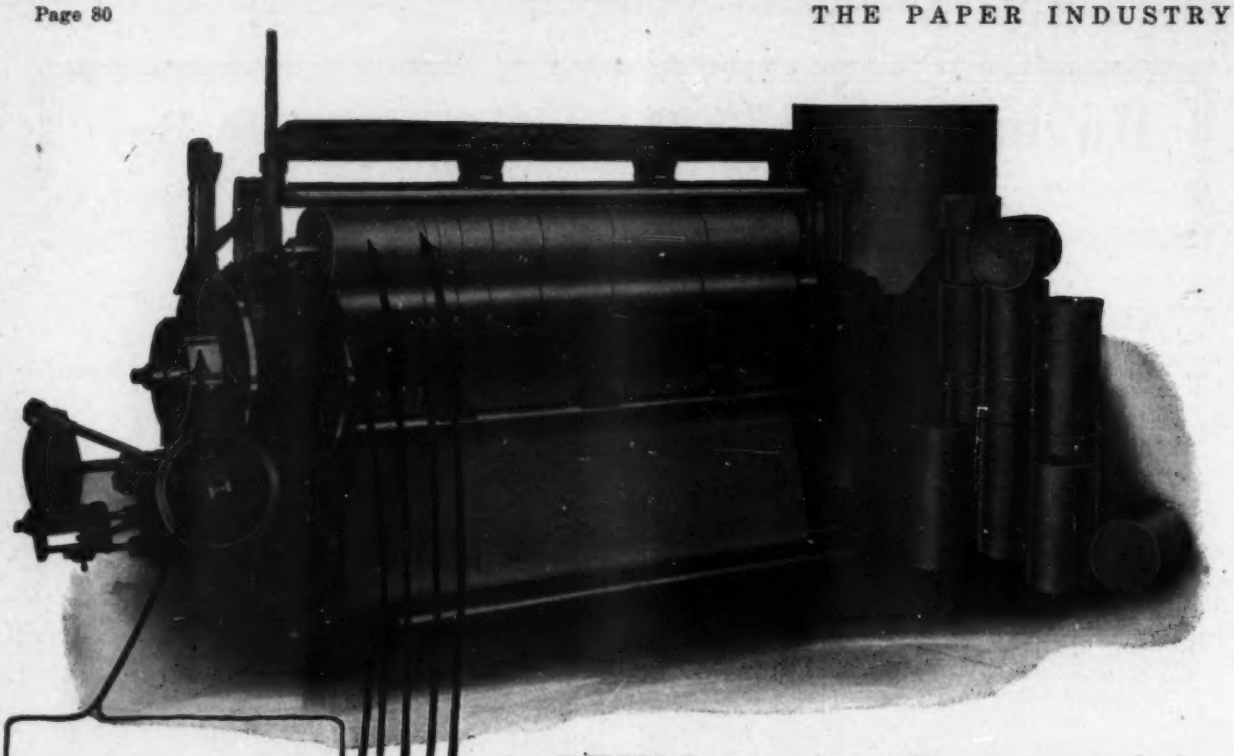
WATER-PROOF CASE LININGS
National Water-proofing Co., Drexel Bldg., Philadelphia, Pa.

WATER-SOFTENING AND PURIFYING SYSTEMS
Wm. Graver Tank Works, East Chicago, Ind.
Wm. B. Scaife and Sons Co., Oakmont, Pa.

WATER WHEELS
James Leffel and Co., Springfield, Ohio.
Holyoke Machine Co., Holyoke, Mass.

WELDING OUTFITS
Imperial Brass Mfg. Co., Chicago, Ill.

WET MACHINES
Valley Iron Works Co., Appleton, Wis.



High Speed Drive

Treadle Control Variable Speed

Even Edges

Firm Even Tensioned Rolls

Quick Change of Cutters

Clean Cut

A FEW Important Features of the Cameron Principle Slitting and Rewinding Machine

The advantage of the Cameron "Score Cutter" method, considered apart from the fact that it is the ideal method to combine with the Surface Rewind, may be summed up as follows:

1. The "Score Cutter" does perfect work on any kind of paper made, as well as fabrics and other materials.

2. The "Score Cutter" gives a clean, smooth slit and does not stretch the edge of the paper.

3. The "Score Cutter" will operate perfectly at unlimited speed as there is practically no friction or wear on the cutting edge.

4. The "Score Cutter" need not be kept to any special diameter, as the pressure spring will take up any variation.

5. The "Score Cutter" does not have a keen cutting edge, but an edge slightly blunt like a cold chisel, and it is easily kept in prime condition by the operator.

6. The same features which make the "Score Cutter" efficient for light duty, make it equally serviceable for heavy duty, as it will handle work from the sheerest tissue paper up to box board.

7. Re-spacing of "Score Cutter" is quickly done by simply releasing the spring pressure on all the cutters at once, and sliding the cutter holders to the new positions.

8. Re-spacing of "Score Cutters" requires only five to ten minutes for any new arrangement of widths. When Gang Spacers are used for narrow strip, even less time is required.

9. Removing or replacing a cutter requires only to lift it on or off its support—holder and all—without disturbing any other cutter or any part of machine.

10. Any width or assortment of widths can be spaced from one-quarter inch up.

11. Strip as narrow as one-quarter inch can be produced by special "Score Cutters."

12. The waste or trim at the edges may be extremely narrow.

13. The rolls produced do not interweave or stick together.

14. Injury to the operator by this method of slitting is impossible.

Send for illustrated catalog

CAMERON MACHINE COMPANY

57-61 Poplar Street, Brooklyn, N. Y.

Alphabetical Index to Our Advertisers

When writing them, please mention The Paper Industry

A — PAGE

American Steam Conveyor Corp., Chicago, Ill..... 53
Appleton Wire Works, Appleton, Wis..... 8

B

Bahr Bros., Marion, Ind..... 61
Bardeen Paper Co., Otsego, Mich..... 66
Bermingham and Prosser, Chicago, Ill..... 5
Buffalo Steam Pump Co., Buffalo, N. Y..... 55
Buffalo Foundry and Machine Co., Buffalo, N. Y..... 57

C

Cameron Machine Co., Brooklyn, N. Y..... 80
Carey, James L., 208 N. Laramie St., Chicago, Ill..... 60
Chandler and Taylor, Indianapolis, Ind..... 73
Claflin Engineering Co., Lancaster, Ohio..... 12
Crane Company, The, Chicago, Ill..... 71

D

Dowd Knife Works, R. J., The, Beloit, Wis..... 76

E

Eagle Knife Bar Wks., Lawrence, Mass..... 73
Economy Engineering Co., The, Chicago, Ill.....Back Cover
Erie Engine Works, Erie, Pa..... 2

F

Federal Sign Co., Lake & Desplaines Sts., Chicago, Ill. 59

G

Glamorgan Pipe and Foundry Co., Lynchburg, Va..... 78
Graver Tank Wks., East Chicago, Ind..... 4
Green Bay Foundry and Machine Works, The, Green Bay, Wis. .....Inside Front Cover

H

Hill Clutch Co., The, Cleveland, Ohio..... 74
Holyoke Machine Co., Holyoke, Mass..... 71
Huband and Nash, Menasha, Wis..... 51
Hudson and Sharpe, Green Bay, Wis..... 51
Hungerford and Terry, Philadelphia, Pa..... 63

I

Imperial Brass Mfg. Co., Chicago, Ill..... 7

K

Kalamazoo Vegetable Parchment Co., Kalamazoo, Mich. 74

L

Lakeside Paper Co., Neenah, Wis..... 49
Leffel and Company, James, Springfield, Ohio..... 62
Lindsay Wire Weaving Co., The, Cleveland, Ohio..... 82

M — PAGE

Michigan Paper Co., The, Plainwell, Mich..... 58
Monarch Paper Co., Kalamazoo, Mich..... 52
Moore and White Co., Philadelphia, Pa..... 1

N

National Waterproofing Co., Drexel Bldg., Phila., Pa. 51
Northern Engineering Works, Detroit, Mich..... 60
Numan, H. O., Green Bay, Wis..... 64

O

Open Coil Heater and Purifier Co., Indianapolis, Ind... 64

P

Perkins and Son, Inc., B. F., Holyoke, Mass..... 68

R

Rex Paper Co., Kalamazoo, Mich..... 69
Roberts Manufacturing Co., Lockport, N. Y..... 10

S

Sandusky Foundry and Machine Co., Sandusky, Ohio.... 50
Savery, Thos. H., Republic Bldg., Chicago, Ill..... 73
Scaife and Sons Co., Wm. B., Oakmont, Pa..... 6
Seaman Paper Co., Chicago, Ill..... 3
Shuler and Benninghofen, Hamilton, Ohio..... 64
Simonds Manufacturing Co., Fitchburg, Mass..Front Cover
Sutherland Paper Co., Kalamazoo, Mich..... 56

T

Ticonderoga Machine Works, Ticonderoga, N. Y..... 50

U

Union Screen Plate Co., Fitchburg, Mass..... 60
United States Victory Loan.....Back Inside Cover

V

Valley Iron Works Co., Appleton, Wis..... 14

W

Watervliet Paper Co., Watervliet, Mich..... 65
Wausau Quartz Co., Wausau, Wis..... 60
Wausau Sulphate Fibre Co., Mosinee, Wis.....49 and 50
Wheat Paper Co., Elkhart, Ind..... 62
Wilson, F. D., 1520 Lumber Exchange Bldg., Chicago, Ill. 68
Wisconsin Wire Works, Appleton, Wis..... 50
Wolverine Paper Co., Otsego, Mich..... 66

The LINDSAY Wire Weaving Company

Manufacturers of

DEPENDABLE FOURDRINIER WIRES

Cylinder Covers and Other Paper Machine Wire Cloth

All Well Made at

Collinwood Station CLEVELAND, OHIO